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Foreign Orders Come Slowly

And Domestic Demand Decreases—Weakness in Prices of Finished Material For Early Shipment

The extreme slowness with which foreign inquiries for iron and steel products develop into orders is having a discouraging effect upon the iron trade. It is generally recognized that early improvement cannot be expected so far as foreign demand is concerned. The domestic demand is likewise very light and a decrease in operating capacity seems probable. The weakness of the market is shown in a tendency toward softness in finished materials for prompt delivery, but owing to the expectations that business will improve after financial conditions become straightened out, sellers are naming higher prices for delivery after Jan. 1. Both buyers and sellers are conservative about contracting for delivery into next year and this attitude contributes toward the dullness of the market at the present time.

Ferro Manganese

Shipments of ferro-manganese from England, including several cargoes which arrived during the past few days, have given further relief, and the usual asking price is now $80, while it is understood that even lower can be done. The shipment of emery to manufacturers of abrasive wheels, which was temporarily suspended on account of the war, has been resumed.

Pig Iron

Pig iron sellers of leading centers say that not for 16 or 17 years has the pig iron market been as dull as at the present time. The unwillingness of buyers to place orders for delivery after Jan. 1 at higher prices than now prevailing is illustrated by the action of the Lukens Iron & Steel Co. in buying only 14,000 tons basic after inquiring for from 35,000 to 40,000 tons. The price paid was $14, delivered, and makers asked advances of at least 50 cents for delivery next year. Light sales, for some time past, of southern pig iron in the Chicago district have indicated the tendency of that iron to be a factor of decreasing importance in that market.

Wire

Inquiries involving considerable tonnage of wire rods and wire products are pending and some sales of fair size have been made. Specifications against contracts for wire products are fairly good, but new business is very light.

Billets

Inquiries for semi-finished steel for the British Isles continue to be received in increasing numbers, but American manufacturers find that their prices are not satisfactory to foreign buyers. One large independent company found that an English consumer's offer on sheet bars, billets and slabs was from $2 to $3 per ton below its lowest quotations. An eastern company has, however, taken an order for 2,000 tons of billets to cover an export order for wire taken by a Trenton company.

Plates and Sheets

Leading makers of plates in the east report a very marked decrease in demand during the past week, and there is very little activity in the plate market in any part of the country. Naturally, prices are weaker, and 1.15c, Pittsburgh, can be done on desirable business. Steel bars are also being quoted on this basis. There is still considerable activity in sheets in the eastern territory and prices generally are well maintained in leading centers, but there is some indication of weakness at Chicago.

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A Banker's Problem

THE emergency shipping legislation and the suspension of certain sections of navigation laws by President Wilson will bring, it is estimated, from 150 to 200 vessels under the American flag. To this extent, the shipping situation will be relieved, but it will not be wise to count upon further help from the government in upbuilding an American merchant marine.

Another, and perhaps more important problem which obstructs the realization by this country of the fruits of an extraordinary situation, remains to be solved. This is the establishment of adequate methods and agencies of credit which are the essential concomitant to an extensive export trade. The difficulties and the slowness which the establishment of such a financial network for the facilitation of commerce necessarily involves very obviously is delaying the export movement. Many countries which heretofore have financed their necessities in England, Germany and other European countries now are turning to the United States to fill the void created by the interruption of these accommodations. It is a commercial truism that trade follows credit. The great success of English and German manufacturers in the South American markets, is attributed largely to their willingness and to their methods for supplying the means of payment for these buyers, as well as the goods.

The main problem of the moment, therefore, if the United States is to grasp its present opportunities, is a banking one. The responsibility and the crucial test now is laid upon the American banking fraternity. They must rise to the occasion and support the work already being ably done to provide methods of transportation, if this country is to reap the golden benefits of the hour. Some of the leading New York banks have taken important steps to establish branch agencies in South America, where the absence of American banking facilities always has placed our manufacturers and business men at a great disadvantage as compared to their European competitors. It has been charged that the American manufacturer or business man has been far too content with his domestic market to apply his ingenuity toward obtaining even that foreign trade which logically should be his. The same lack of vigorous extension can be seen in the past policies of American bankers. An unusual opportunity now is at hand for completely changing this situation. May the American bankers hasten to extend to the present unsettled trade of this country the strength and support of their arm that the whole nation may reap the reward for which naturally and economically it is fitted.

Real Work for Safety

THE recent meeting of the Lake Superior Mining Institute brought out one fact in clear relief. A long depression in the iron ore market and a great European war with its accompanying disturbance of business, has not been able to dull the interest taken by mine operators in protecting their employes from injury and sickness.

The opening feature of the convention was a "First Aid" meet. Twelve teams, each composed of six men, demonstrated just what a few months' training could accomplish in schooling miners, with no medical training in the giving of proper attention to various classes of injuries. These teams represented both the Michigan and Minnesota ranges. It was the first time that such a meet had been held in these mining districts and its success was such that it will be made a permanent feature of future meetings.

Illustrations published in THE IRON TRADE REVIEW last week showed the great skill obtained by these miners in such difficult "first-aid" work as treating a patient with a broken back. This skill has been obtained largely through the co-operation of the mining companies, many of which have appointed safety inspectors whose sole duties are to investigate all phases of the mine's activities and report any improvements necessary to protect the workmen.

"Safety First" has become so common that its real meaning sometimes is obscured. A visit to the iron mining district will convince

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one that it is a very present issue that mine operators regard as of the highest importance.

The Dramatic Element

A SURVEY of the proceedings of the recent convention of the allied foundry associations at Chicago brings out the fact that the greatest interest was manifested, not in the many excellent formal papers that were presented, but in the addresses of such finished speakers as M. W. Alexander and Harrington Emerson and in such reports as that of the committee on steel foundry standards. Committee reports, when they represent aggressive work, are naturally of surpassing interest, because they are the result of the collective effort of a considerable number of the members of the association and usually treat of subjects of a timely nature. The most flourishing technical societies are those that do a large part of their work through the medium of committees.

It is not difficult to find plenty of men to write papers of interest and value. The extraordinary volume and great intrinsic worth of the papers contributed to the foundry convention attest this fact. But it is quite another thing to find men who not only can write satisfactorily, but at the same time can present their contributions before an audience in such a manner as to hold attention and make a favorable impression. Such men are comparatively rare, for attractive presentation requires stage presence and at least some dramatic instnct. Mr. Alexander, in giving his address on safety and accident prevention, utilized dramatic talent of no mean order and did not hesitate to surround himself with suitable stage properties. Instead of merely talking about molders' shoes, foundry leggings and chicken wire splints, he put on the shoes, wore the leggings and demonstrated the use of the wire net splint on the arm of no less a person than President Howell. Mr. Alexander had no difficulty in holding his audience for well over an hour, during which time he drove home many lessons in safety and sanitation that will never be forgotten by those who were privileged to listen to him. In a similar manner, Harrington Emerison, with the aid of a pack of cards, put the breath of life into the dry subject of cost-keeping.

These incidents point out the proper method to follow in planning future conventions. Committee reports are well received because they represent the work of the members themselves and speakers are welcomed when they can present bare facts and useful information in an attractive dress. The progressive technical societies realize these facts, and are arranging their programs accordingly.

Agitators and Politicians Not Needed

THE bureau of labor statistics of the Department of Labor has published a bulletin on the experience of foreign countries in the administration of labor laws and factory inspection. The bulletin states that in only one of the phases of administrative work was marked superiority found in the countries visited as compared with the United States. This was in the training and character of the inspectorial force. In Europe, the position of factory inspector can be obtained only after long technical training and severe tests. The occupation is classed as a profession ranking with law, medicine and engineering. Men who seek these positions are of exceptional character and attainments and their work is correspondingly efficient.

The bulletin does not describe the kind of men who act as inspectors in the United States. Some of them are, of course, men of ability and high character, but entirely too many of them were formerly labor agitators and peace disturbers or broken-down politicians. In the selection of inspectors, two classes of men are particularly to be avoided, those who have radical, unreasonable views in regard to relations of capital and labor, and politicians who will try to use their positions for partisan purposes. In this service, the strictest kind of a merit system is absolutely necessary.

Prices Present and Past

Quotations on leading products today, average for last month, average for three months ago and average for September, 1913. Prices are those ruling in the largest percentage of sales at the dates named.

	Today's prices.	Average for Aug., 1914.	Average for June, 1914.	Average for Sept., 1913.
Bessemer pig iron, Pittsburgh..	14.90	$14.90	$14.90	$16.65
Basic pig iron, Pittsburgh.....	13.90	13.90	13.90	15.09
No. 2 Fdy. pig iron, Pittsburgh.	13.90	13.90	13.90	14.90
Northern No. 2 Fdy., Chgo....	13.50	14.00	14.25	15.00
Lake Superior Charcoal, Chgo..	16.00	15.75	15.75	15.00
Malleable Bessemer, Chicago....	13.50	14.00	14.25	15.00
Southern No. 2, Birmingham....	10.00	10.00	10.38	11.00
Southern Ohio No. 2, Ironton..	13.00	13.25	13.50	14.00
Basic, eastern Pa.....	14.00	14.00	14.00	15.25
No. 2X Virginia furnace.....	12.50	12.50	12.75	13.00
No. 2X Foundry, Philadelphia...	14.75	14.75	14.75	16.00
Ferro mang., Balti.....	80.00	125.00	37.50	55.00
Billets, Pbgh. & Ygn.....	21.00	20.00	19.75	25.00
Sheet bars, Pbgh. & Ygn.....	22.00	21.00	20.75	25.62
Steel bars, Pittsburgh.....	1.20	1.17½	1.11½	1.40
Iron bars, Philadelphia.....	1.25	1.20	1.20	1.37
Steel bars, Chicago.....	1.38	1.30	1.28	1.58
Tank plates, Chicago.....	1.38	1.36	1.28	1.58

	Today's prices.	Average for Aug., 1914.	Average for June, 1914.	Average for Sept., 1913.
Structural shapes, Chicago.....	$1.38	$1.36	$1.28	$1.63
Iron bars, Cleveland, local del'y.	1.20	1.20	1.22½	1.41
Iron bars, Chgo. mill.....	1.07½	1.07	1.10	1.35
Beams, Pittsburgh	1.20	1.17½	1.10	1.41
Beams, Philadelphia	1.30	1.30	1.25	1.55
Tank plates, Pittsburgh.....	1.20	1.16	1.11½	1.40
Tank plates, Pittsburgh.....	1.15	1.16	1.11½	1.40
Sheets, blk., No. 28, Pittsburgh.	2.00	1.88	1.82	2.12
Sheets, blue an., No. 10, Pbgh..	1.40	1.37½	1.35	1.61
Sheets, galv., No. 28, Pbgh.....	3.00	2.85	2.77	3.15
Wire nails, Pittsburgh.....	1.60	1.55	1.50	1.65
Connellsville fur. coke, contr....	1.75	1.80	1.85	2.44
Connellsville fdy. coke contr....	2.35	2.36	2.40	3.00
Heavy melting steel, Pbgh.....	11.50	11.50	12.00	12.50
Heavy melting steel, east'n Pa..	11.00	10.50	10.75	12.00
Heavy melting steel, Chgo.....	9.25	9.75	9.75	10.50
Heavy cast, eastern Pa.....	12.25	12.25	12.50	13.25
No. 1 wrought, eastern Pa.....	12.50	12.50	12.50	14.50
No. 1 wrought, Chgo.....	8.25	8.75	8.88	10.25
Rerolling rails, Chgo.....	10.50	11.25	11.25	12.00
Car wheels, Chgo.....	10.75	11.00	11.00	12.50

(For Additional Prices See Page 560.)

Eastern Pig Iron Sales Increased

But There is No Substantial Improvement in Any Part of the Country—Buyers Refuse to Pay Higher Prices for Future Delivery

Philadelphia, Sept. 14.—Sales of pig iron in this district during the past week and 10 days have aggregated a larger total, but there is no evidence of genuine improvement. Furnaces continue to blow out and three additional stacks, Warwick A, Leesport and Musconetcong, have joined the idle class. August reports to the Eastern Pig Iron Association show a sharp falling off in both stocks and in orders. While makers are not exerting themselves to sell at ruling prices and are asking advances for forward deliveries, the buyers are not willing to discount the future in this fashion and decline to pay the higher prices quoted. This was illustrated in the case of the Lukens Iron & Steel Co., which closed last week for 14,000 tons, practically all basic, for this year's delivery at $14, delivered, as reported. This buyer also sought to contract for basic for shipment beyond Jan. 1, but upon being quoted $14.50, delivered, as minimum, decided not to close at this time. The Lukens company also bought 800 tons of Bessemer from an eastern maker at about $16, delivered. There has been no interest in basic shown by other eastern steel works. Some of these consumers, in fact, have been asking the postponement of monthly quotas on old orders and some cancellations of the deferred tonnage by the furnaces have resulted. There are some small inquiries for Bessemer in the market, one for 350 tons and the Norfolk & Western railroad is closing this week on 600 tons of Bessemer in addition to 1,000 to 1,200 tons of charcoal and foundry iron for Roanoke. A buyer in this territory purchased 1,000 tons of western malleable of special analysis at $16.35, delivered. Some inquiries for low phosphorus iron to replace English hematite have been coming to eastern makers from Canada, but there have been no sales. Domestic demand for low phosphorus, either standard or Lebanon brands, is quiet. Cast iron pipe makers have been buying more liberally. Sales of about 5,000 tons of low grade iron were made to two Delaware river consumers and another 1,000 tons went to an eastern Pennsylvania pipe foundry. Northern pipe iron is bringing about $13.75, delivered, but one buyer now in the market for 2,000 to 3,000 tons and may buy more, is offering only about $13.25, delivered. Small sales of mill forge at $14, delivered, have been made, but 25 cents less could be done on a tonnage. An inquiry for 500 tons of mill iron for England is out. Eastern Pennsylvania and Virginia foundry irons are unchanged in price.

Pittsburgh Pig Iron Stagnant

Pittsburgh, Sept. 15.—Pig iron, both at this center and in the valleys, continues dull and inactive, and, with requests for suspensions more frequent, it is not improbable blast furnace operations will be further curtailed. Melters do not appear at all concerned about the future, and many of them have been forced to offer notes for tonnages on account of the stringency in finances, caused by the war. Inquiries, except a tentative one connected with New York tube work, previously mentioned, are of no importance. Prices, untested, are unchanged in position.

Prices Hold at Buffalo.

Buffalo, Sept. 15.—There has been no change in the price situation at Buffalo within the past week, although it is understood that concessions are obtainable on the higher silicon irons in desirable tonnages and deliveries.

The market is quiet as far as new business goes. Reports to furnaces indicate that many of the foundries of the district are operating on less than a normal basis. This is said to

(*For complete prices see page* 560)

be especially true in the stove manufacturing business.

Slight encouragement is noted in the shipments going forward from the producers. Few suspensions or curtailments of tonnages under contract have been requested. This is attributed to the fact that consumers were conservative in their bookings and are now taking out only the iron required for early needs. One furnace interest reports the sending out of 50 cars on a single day during the present week, in addition to shipping some lots via canal to melters down state.

Very Dull at Cleveland

Cleveland, Sept. 15.—Dullness continues in the pig iron market in the Cleveland district and agencies having furnaces along the lakes report that sales are few and tonnages light. Deliveries on contracts are fair. Prices are unchanged and untested.

Small Sales at Chicago.

Chicago, Sept. 15.—Small lots only of pig iron are being sold in this territory, the metal going into immediate consumption. These lots vary in size from one carload to a couple of hundred tons, but the latter are few in number. True it is that good tonnages are on the books of local makers, but shipments continue to be held up at this time just as in the past month. It was expected more buying of iron for future delivery would have been noted by this time, the middle of September, but so far such buying has not appeared. Even inquiries are few and large sales houses in this territory received only three inquiries today and none of those three for more than 100 tons. Prices are unchanged, local furnaces quoting from $13.50 to $14 for both No. 2 foundry and malleable. Some off iron has changed hands in this territory at slightly below this minimum, but no trace can be found of sales of standard iron below the usual quotations. Southern iron is a negligible factor in the Chicago market at this time.

Extremity of Dullness

Cincinnati, Sept. 15.—The pig iron market is experiencing one of the dullest periods in its history. Dealers who have been in business for years state that never in their experiences has demand been so low or sales so few and scattered. Melters are withholding shipments even on carload orders in many cases and it is apparent that no iron could be sold in this territory at the present time even at very low prices.

Although furnaces state emphatically that no iron is to be had in Alabama below $10.25, Birmingham basis, for No. 2 foundry for the last quarter, buyers are of the opinion that the price is not changed and that $10, Birmingham basis, for this grade can be done in a few instances. Tennessee iron is obtainable at $10, Birmingham basis, for No. 2 foundry, although one furnace in this state has advanced to $10.50, Birmingham basis, as the minimum quotation for the last quarter. The dullness of the market has made southern resale prices a little uncertain, as concessions are being temporarily granted from time to time in order to induce buying. Furnaces are running along more evenly and the price for furnace iron is more firm than that of resale iron.

The reduction of southern Ohio No. 2 foundry and malleable iron to $13, Ironton basis, for the last quarter, has not brought any inquiry or demand and sales if anything have fallen off a little since this decline took place. Dealers state that they are not figuring on anything larger than lots of a few hundred tons each and that a number of these have been sent out more to test the market than anything else.

Very Few Inquiries

St. Louis, Sept. 15.—Inquiries for pig iron in the St. Louis market continue to be limited to car lots and very few of them. The demand for ferro-manganese has lessened considerable, and the price has dropped from $125 a ton two weeks ago to $85 a ton. Southern No. 2 is quoted at $10.50 to $10.75, Birmingham basis, with a freight rate of $3.75 a ton. Northern iron is held at $13.50, Ironton, and $14.50, Chicago furnaces. There is virtually no demand for it.

Hopeful at Birmingham.

Birmingham, Ala., Sept. 15.—The pig iron market shows little change from week to week, and while the trade is no stronger it is no weaker, which is accepted by producers as an encouraging sign. No sales of any magnitude have been reported during the week, but this apparently is not a source of anxiety to makers.

"We are not worrying about the lack of business at the present time," said the sales manager of one of the larger independent companies. "Our furnaces are operating at full capacity but the stock is not piling up on us, as we were sold out up to Jan. 1 before the depression came. Inquiries in hand show that there is no necessity for fear as to the situation after the first of the year. My company regards the situation as inherently sound."

Quotations are steady at $10.25 for immediate delivery and $10.50 up to the first of the year. One big concern continues to hold its iron at $10 for immediate delivery, but reports no unusual volume of sale thereby. Inquiries for first quarter delivery are consistent and serve to buoy up the market.

Shipments at the present time are heavy, heavier than production, which is regarded as a good sign. The producers are unwilling to stock up heavily and are proceeding cautiously with business for the coming year.

Birmingham makers, with the inauguration of the new tariffs to the west and northwest, are anticipating entering a new field. The rates provide for a reduction of 35 cents per ton on iron to mid-western points which, it is believed, will enable Birmingham companies to compete with Pittsburgh. The new rates will go into effect the first of the month; rumors that the roads would be granted an extension are given little credence here.

The erection at New Orleans by two railroads serving the Birmingham district of facilities for handling coal and iron for South America and the increasing offerings of bottoms for the Latin American trade were the only developments looking to the entry into the south of Birmingham makers.

Reports of Low Prices Denied

New York, Sept. 15.—Periodical reports of irregularity of Buffalo iron prices for New England delivery again are to be heard in the market, but statements that Massachusetts textile machinery interests have bought considerably under $13, furnace, for No. 2X, are not credited. A Hopedale, Mass., textile machinery builder four of five weeks ago quietly closed for a round block of metal, 8,000 tons, or more, which has been referred to previously in THE IRON TRADE REVIEW, and a considerable part of this tonnage went to Buffalo makers at $13.50, furnace. This buyer again is figuring and is endeavoring to close at $12.50, Buffalo, but has not been successful. A Lowell textile machinery builder also has been figuring on 2,000 tons or more and has bought a portion of this requirement of Buffalo furnaces at $13 or higher. The going Buffalo market today is $13 to $13.50, furnace, but some makers still insist they are holding for $14, furnace. The local market is very dull. Only small inquiries are current. A soil pipe maker has been buying some lots in 500-ton transactions. Northern, 2X is quoted at $14.50 to $14.75, tidewater.

(*For complete prices see page* 560)

Sheet Prices Untested

But Show Considerable Regularity—Demand Still Active in the East

Philadelphia, Sept. 14.—The maintenance of a healthy demand for sheets brings encouragement to eastern Pennsylvania makers, though prices still are not very remunerative. On light sheets the leading eastern maker remains practically oversold and is declining some orders. For the heavier gages the demand from many miscellaneous sources holds up well and buyers invariably want quick delivery. The makers have not been able to comply with all deliveries as requested and some shipments are behind. For No. 10 blue annealed the minimum price now prevailing in the east is 1.60c, Philadelphia, or 1.45c, Pittsburgh, but makers name this figure only when obliged to by competition, and most of the current bookings for eastern delivery are at 1.50c, Pittsburgh.

Sheets Not so Active

Pittsburgh, Sept. 15.—Indications are that the September sheet market will fall far below that of August, from a standpoint of new business and specifications, as there already has been a noticeable slowing down in this department. Mill operations have been correspondingly affected. Prices, however, appear to be firmly maintained, although there has not been enough selling this month to test quotations. All things considered, however, the sheet market continues one of the most active at this center.

Prices Maintained

Cleveland, Sept. 15.—In spite of the continued limited demand for sheets, prices are being well maintained. The appearance of the Otis Steel Co. in the market as a manufacturer and seller is an important event in the sheet market. Prices continue on a basis of 1.45c, Pittsburgh, or Youngstown, for No. 10 blue annealed, 2c for No. 28 black and 3c for No. 28 galvanized.

Mills Conservative

Cincinnati, Sept. 14.—Mills in this vicinity are still refusing to sell for shipment beyond October, and maintain that better prices should prevail for the last quarter. Orders for new business continue good and are coming from all parts of the country. Specifications are mostly on new business, as supplies throughout the country were very low up until three weeks ago, when the present buying movement began. Prices are a little stiffer but unchanged at 2.15c for black No. 28 gage, 3.15c for galvanized No. 28 gage and 1.60c for blue annealed No. 10 gage, all Cincinnati basis.

Suspicion of Shading

Chicago, Sept. 15.—Both galvanized and black sheets No. 28 gage, up to this time had been holding firmly at 3c and 2c respectively, but a strong suspicion now is entertained in some quarters that these prices are being shaded $1 a ton. Some credence is given to the statement of some makers that the drop in the price of spelter to around 5.65c, Chicago, has had something to do with the sentimental price softening in galvanized sheets. No large tonnages have been taken at any of these figures and it probably would require a good sized order to mark a definite stage in the price situation today. Such a definite tonnage, however, does not appear to have entered this market.

Cast Iron Pipe Buying

Is Very Limited—Bids Being Taken on 4,000 Tons for Cuba

New York, Sept. 15.—With new business in cast iron pipe very slack in the eastern market, there is keen competition among the foundries for such business as is offered and lower prices have appeared. Makers generally have been quoting not below $18.50 to $19, foundry, for 6-inch, but prices considerably below this range now have appeared. John Fox & Co. took 320 tons of 8-inch for Yonkers, N. Y., at $19.78, delivered, or $17.38 at the plant. The same seller took 350 tons of 20-inch from the Brooklyn Union Gas Co. at $19.40, delivered, or slightly under $18 at the shop. The District of Columbia is taking bids this week on 1,000 tons of 8-inch. Buyers of pipe are displaying an indifferent attitude at the present time, which is attributed in the main to their inability to obtain financial support for their enterprises. The municipalities are doing very little. The export trade is developing slowly, but a requirement of 4,000 tons, principally 12, 16 and 20's, for the Santa Clara province, and Cuba, now has reached a definite stage and bids are being taken for this lot of pipe. The award of the 22,000 tons of cast iron and segments for subway tunnels in Brooklyn has been delayed through easements being taken to the property required for this construction.

Very Few Lettings

Chicago, Sept. 15.—Inquiries for cast iron pipe are at a minimum in the central west, and lettings the past week have been fewer than in some time past. It will be recalled that another letting dated Sept. 22 will be had in the 700-ton inquiry from Casper, Wyo., this letting having to do with the revised tonnage. The United States Cast Iron Pipe & Foundry Co. has taken 500 tons of 36-inch pipe for the Highland Park intake. This maker also has taken 100 tons for Springfield, O.

(*For complete prices see page* 560)

Lake Vessels

Will Go Into Winter Quarters at Unusually Early Date

Cleveland, Sept. 16.—The ore trade exhibits no change and shippers expect to close early. Ore sales are few and not enough new business is expected to make any change in the market.

The ore fleet in all probability will be in winter quarters by the middle of November.

Foreign Ore Arrives

New York, Sept. 15.—The Norwegian steamer Hardanger has been chartered from Marbella, Spain, to Philadelphia, with 4,000 tons of low phosphorus ore at 10s. This rate represents a sharp advance over the freight which normally prevails between these points. The shipment is being made upon an old order. A few cargoes of trans-Atlantic ore continue to arrive at Philadelphia. These principally have been from Sweden by way of Narvik, though occasional lots of Spanish ore are being received. The British steamer Winlo, from Narvik, with a cargo of Swedish ore, arrived at Philadelphia Sept 14. The eastern ore market remains lifeless.

Keener Interest in Bars

In Chicago District as to Operations of Agricultural Implement Makers

Chicago, Sept. 15.—As the season approaches when agricultural implement makers will begin to draw upon the mills for the first of their steel and iron bar supplies for the new manufacturing year, keener interest is being taken in the works and warehouse operations of the implement makers. It is the feeling in Chicago that the implement warehouses have cut down their surplus stocks of last season fairly well, while in some instances the implement warehouses are reporting their stocks of finished machines below normal. This is regarded by bar makers as a somewhat more satisfactory sign since iron and steel specifications for October and November delivery are expected to be placed within the next few weeks. Little definite new tonnage for steel bars has come out the past week, but the run of specifications in the last few days has increased slightly.

Bars Drag with Structurals

Pittsburgh, Sept. 15.—Manufacturers of steel bars in the Greater Pittsburgh district have experienced a falling off in demand this month, as a result of the war that has greatly disturbed the channels of trade and commerce. Material is being held at 1.20c, but attempts to secure 1.25c for fourth quarter now appear out of the question. There has been some inquiry for last quarter delivery.

Little More Business

New York, Sept. 15.—Here and there some new orders for steel bars are being placed, as it is stated, some manufacturing consumers have been enjoying a little better business. On the whole, however, the new business side of the market is very small at present. Specifications are of medium volume. Though prompt bars have been offered at 1.15c, Pittsburgh, in other eastern districts, the market appears firm in this territory at 1.36c, delivered, or 1.20c, Pittsburgh.

Prompt Bars at 1.15c

Philadelphia, Sept. 14.—For immediate delivery and upon desirable specifications steel bars are being offered in this territory at 1.30c, Philadelphia, or 1.15c, Pittsburgh. A sale of 200 tons upon this basis was made to an eastern Pennsylvania nut and bolt maker. On contracts and on small orders, however, 1.35c, Philadelphia, or 1.20c, Pittsburgh, is generally held. Specifications are in medium volume, but there is not much new business. One of the eastern railroads is figuring informally upon its last quarter requirements, about 2,000 tons, mainly small angles and bars. An inquiry for a considerable tonnage of reinforcing bars for a Cumberland, Md., building operation is current. Shafting still shows irregularity. Quotations of 66 and even 67 off made in fair-sized inquiries within the week did not obtain the business.

Slightly More Inquiry

Buffalo, Sept. 15.—Light but slightly increasing inquiry and light sales at Buffalo characterize the market for the week in bars, plates and shapes. There has been placed a considerable number of single carload orders of the various lines, but not aggregating any particular tonnage, indicating a disposition on the part of users to cover cautiously for immediate needs only at this time. Some of the mills and agencies of the district report a slight improvement in specifications.

Prices are being maintained by all interests at 1.20c, base, for desirable tonnages, and on smaller lots the price of 1.25c is being quoted.

Some of the consuming interests buying in the Buffalo market have endeavored to place their orders under contracts covering their needs into the next year. The producers, however, are confining the business to last quarter deliveries. Where prices are quoted for shipment into 1915 they are at a figure calculated to quiet inquiry rather than secure offerings made.

May Do Better Business

Chicago, Sept. 15.—Some fair tonnages of specifications have come in the past week to wrought iron bar makers in this territory, and there is a feeling noted that with the low price of scrap prevailing while the price of iron bars holds to 1.07½c to 1.12½c, Chicago, it is possible the rolling mills will do better business between now and November than they have been doing all summer. This is largely due to improving prospects of agricultural implement makers, for so far only two railroads have been buying bar iron in Chicago to any extent and even these tonnages were limited.

Hoops, Bands and Shafting

Pittsburgh, Sept. 15.—Comparatively speaking, the market for hoops and bands in the Greater Pittsburgh district is holding its own fairly well. There has been some new demand, and makers show no disposition to shade 1.30c and 1.20c for hoops and bands, respectively. Shafting, quotable at 66 per cent off list, is quiet.

(For complete prices see page 560)

Flurry in Tin

Has Disappeared and Tin Plate Market is Normal

Pittsburgh, Sept. 15.—The tin plate market in western Pennsylvania and eastern Ohio again is considered normal, and nominal prices have declined as quotations for pig tin gradually dropped back to their former levels. There has been no new selling of consequence, and it is not probable makers will name 1915 prices until the end of the year, unless general conditions become normal at an early date. Mills are operating at practically maximum capacities.

Warehouse Business is Light

New York, Sept. 15.—A slight progressive improvement in warehouse business has been noted by leading sellers in this district during the past several months. This movement still obtains but the change from week to week is so small that it remains for the monthly totals to disclose the betterment. Prices are unchanged.

Business Slow

Cincinnati, Sept. 14.—Business continues about the same as it has been since Aug. 15, being slow and not altogether satisfactory. A fair demand for building materials is being experienced, as building permits issued in Cincinnati showed an increase of 124 per cent in August over the corresponding period last year. Several large bridges that are being built in this vicinity have also brought out a demand for reinforcing bars. Local warehouses have not been selling many sheets recently, as rolling mills have been taking orders direct.

Slight Change for Better

Chicago, Sept. 15.—A little more activity on the part of buyers is reported by Chicago warehousemen and the increase is said to be divided among all the more important lines of finished steel. Prices are holding unchanged.

Price of Ferro Declines

English Makers Quote $5 Below the Steel Corporation Price —More Tonnage Arrives

New York, Sept. 15.—A reduction of $20 a ton or to the basis of $80, seaboard, including war insurance, has been put into effect by English makers of ferro-manganese, for delivery in the near future, principally in October or November. This sharp break from the $100, seaboard, level, which previously had prevailed, indicates the relieved position of the ferro-manganese market for early delivery. It also is believed that the recent announcement that the Steel Corporation has been selling this alloy at $85, Pittsburgh, has been a leading factor in influencing English makers to take this step. At this time, however, the Steel Corporation is not an active seller. Some small sales on the $80, seaboard, basis have been closed. There are reports in the market that $75, seaboard, can be done with certain sellers and some buyers in the Philadelphia district have been reporting offers at this figure. Sales of the past week have been light.

Shipments are Heavy

Arrivals of ferro-manganese from England, to apply principally upon old contracts and to fill some recent additional sales, now are coming in freely. The Steamer Quernmore, which docked at Baltimore on Sept. 9, brought in 3,100 tons; the Majestic Exchange, with 875 tons and the Haverford, with 350 tons, arrived at Philadelphia, Sept. 14; the Kylestrom is enroute to Mobile, with 1,200 tons and the Sylvania now is coming in at New Orleans, with more than 1,000 tons. The Graciana, now afloat, has a large quantity on board, estimated at 3,000 to 4,000 tons.

Manganese Ore

Some interest continues to be shown in manganese ore by prospective makers of ferro-manganese, both among merchant interests and steel makers in this country but no further sales are reported. Some lots of Indian ore, now afloat, remain under negotiation. The steamer Baron Ogliva arrived at Philadelphia the past week from Bombay, with 6,450 tons of Indian ore for the Carnegie Steel Co. This vessel left Bombay on July 28. It is stated that during its trip, the value of this cargo practically was doubled. Some talk of Cuban manganese ore continues to be heard in the market, but there have been no developments in this direction. Battery manufacturers have been buying some lots of peroxide of manganese, which have been in stock in this country from arrivals before the war and have been paying price advances of 300 to 400 per cent.

Pennsylvania to Make Ferro

The Pennsylvania Steel Co., which recently purchased several cargoes of Russian manganese ore, as reported at the time, is making arrangements to resume the manufacture of ferro-manganese for the needs of itself and affiliated companies. In all probability, one of the stacks at Steelton will be put upon the production of this alloy in the near future, when ore shipments arrive. In former years, the Pennsylvania Steel Co. on different occasions, has been a producer of ferro-manganese for its own requirements.

Alloys Quiet at Pittsburgh

Pittsburgh, Sept. 15.—The market for ferro-manganese in western Pennsylvania is quiet, and, despite reductions in quotations, no sales are reported. Notwithstanding contrary reports from the east, the Carnegie Steel Co. reports it is not figuring in the market as a seller of ferro-manganese. One of the Dunbar furnaces, at Dunbar, Pa., will be blown in the latter part of this month and will operate on ferro-manganese from domestic ores after a fortnight's run on basic pig iron. The market for other alloys, including ferro-silicon and titanium, is quiet.

Plate Business Declines

And Prices Are Weaker in Some Centers—Lighter Orders From Railroads in the East

Chicago, Sept. 15.—The cheerful feature of the plate market in the Chicago district is firmness of the price. While tonnages coming to plate mills are small, the volume of specifications this week is slightly better than last week as reported by some mills. There being no car work in sight other than the uncertain C., H. & D. business, it is expected that the mills will be able to continue operating only on the outside plate business which is coming in small tonnages, but few new aggregate tonnages of size are going these days. Plates are selling in Chicago at 1.38c and no deviation has been heard.

Shading at Cleveland

Cleveland, Sept. 15.—Continued dullness in the plate market in the Cleveland district has resulted in concessions being granted and 1.15c, Pittsburgh, can now be done on desirable business. The slackness in demand is shown in the less than carload orders for boiler plate being placed by some large consumers and it is evident that all buyers are limiting their purchases strictly to early requirements.

Plates in Lethargic Condition

Pittsburgh, Sept. 15.—A nervous financial market throughout this and foreign countries apparently has brought a sudden halt in buying of finished steel products, and no change in the situation is expected until the dark war cloud lifts. Specifications for plates have fallen off, mill operations have dropped to 60 per cent and below, and makers have abandoned hopes of obtaining 1.25c for fourth quarter shipment.

Falling Off in East

Philadelphia, Sept. 14.—A rather abrupt falling off in new business with eastern plate makers has been shown during the past two weeks. Where some of these mills in August turned out the largest tonnage in fully a year, the volume this month has been cut sharply. Small orders are rather numerous, but in the aggregate represent only a modest quantity. The decline in railroad business is marked. There is practically no locomotive business and the Baldwin Locomotive Works is reducing drastically its operations. The American Car & Foundry Co., which has been figuring with eastern mills on 5,000 tons of car plates, has deferred this matter indefinitely. About 1,800 to 2,000 tons of plates will be required for the coaling plant at Cristobal, Panama canal, bids for which are about to be opened. Swedish ship yards inquired of eastern plate makers this week and there have been other foreign negotiations inaugurated, but no orders are reported. Prices remain at 1.30c to 1.35c, Philadelphia, or 1.15c to 1.20c, Pittsburgh.

(For complete prices see page 560)

Scrap Conditions Mixed

In Eastern Territory—Moribund in Almost All Centers

Philadelphia, Sept. 14.—The eastern Pennsylvania scrap situation is mixed, there being elements both of strength and of weakness. A large Lehigh valley steel works reappeared in the market in the week and closed for several thousand tons of heavy melting steel at $11, delivered, the top price. The order was widely distributed and it reached a round tonnage, probably not less than 5,000. Other eastern steel works, however, are not offering over $10.50, and the brokers who have been bidding up the market recently also have dropped their offers to $10.50, delivered, maximum. A leading consumer of wrought pipe in the week advanced its offers 50 cents to $11, delivered, and purchased some tonnage. Some sales of No. 1 railroad wrought at $12.50, delivered, of turnings and borings at $8.75, delivered, and of iron axles at $20, delivered, are reported. Cuba has been shipping considerable scrap to this market, largely sugar mill machinery. Several cargoes have come in, and one of 1,800 tons arrived a short time ago. The Norwegian steamship Vitalia has been chartered to bring in a cargo of Panama canal scrap to Philadelphia.

Some Buying at New York

New York, Sept. 15.—Some further buying of heavy melting steel and wrought pipe both at $11, delivered eastern Pennsylvania, was done in this market the past week. The steel was purchased by a Lehigh valley steel maker and the pipe by a Lebanon valley consumer. Brokers continue to offer up to $9.25, New York, for steel, for old contracts, some of which at $11.50, delivered, still are outstanding. Shipments on one such order to Roebling, N. J., have been ordered resumed. Sales of steel at $9.10, New York, are noted. The yards still pursue the policy of holding to their stocks expecting higher prices. Consumers are buying only in a scattered way and the market is not making much progress from week to week.

Trading Declines

Buffalo, Sept. 15.—Trading has dropped off to practically nil during the current week, another lull having developed. There is no disposition on the part of the dealers to further soften prices in order to bring out the consumers. The attitude of the users is one of continued uncertainty as to the future, while dealers seem to be inclined to believe that prices will advance rather than decline. The only improvement noted is in locomotive grate bars which have stiffened from $8.50 to $9 to a price of $9 to $9.50.

Continues Sluggish

Pittsburgh, Sept. 15.—The market for old materials at this center is duller than ever. Quotations for all grades are considered nominal.

Low Prices at Cincinnati

Cincinnati, Sept. 14.—Dealers continue to offer large concessions on all forms of scrap in order to induce buying, but all efforts have been unsuccessful, and demand remains at a minimum. Rolling mills maintain that they have enough scrap to fill their requirements for several months, and will not add more to their supplies. Foundries are operating at such a small percentage of their capacities that their purchases have been extremely small lots for spot shipment. Dealers have long since disregarded any general level of prices and are quoting separately on each sale depending entirely upon surrounding conditions.

Still Waiting

St. Louis, Sept. 15.—Dealers in scrap iron at St. Louis are still playing a waiting game, and such buying as is going on is for speculation. There are no important lists out from the railroads this week. Prices are unchanged from last week.

Heavier Tonnages Offered

Chicago, Sept. 15.—Continuation of the heretofore prevailing buyers' market is noted this week in that heavier tonnages are being offered in the railroad lists now coming out. In fact, these lists are the heaviest in months. The Northern Pacific offers 1,000 tons; Minneapolis, St. Paul & Sault Ste. Marie has put out two lists, one of 1,500 tons and the second of 900 tons; the Chicago, Peoria & St. Louis, 800 tons; Michigan Central, 2,700 tons; Chicago, St. Paul, Minneapolis & Omaha, 1,100 tons; Union Pacific, 2,000 tons and the Southern railway, 4,600 tons. Re-rolling rails have declined 50 cents and No. 1 wrought 25 cents a ton, and this concession of 25 cents per ton has extended to other lines of material influenced by the railroad lists. Few sales are being made and the general listlessness of the old material market is at least as pronounced as it is at other centers. The rolling mills are not taking much material in their lines either.

(*For complete prices see page* 560)

Billet Makers

Still Quoting on Foreign Inquiries—Little Business Results

Philadelphia, Sept. 14.—Eastern billet makers continue to quote on numerous inquiries for export, usually for the British Isles, and are following these matters closely, but few actual sales have been made. A sale of 2,000 tons of billets, however, was made by an eastern Pennsylvania maker to an eastern manufacturer of wire goods, to cover an export order for the finished product. A maker in the Pittsburgh district who was closely pursuing an inquiry for 5,000 tons of billets, slabs and sheet bars for England, dropped this matter because the prices offered were $2 to $3 a ton below its quotation. The domestic market on billets in the east remains narrow, consumers buying only in a listless way. The market is quotable at $22.40 to $23.40, Philadelphia, $20 to $21, Pittsburgh, on rolling steel.

Sheet Bar Specifications Hold

Pittsburgh, Sept. 15.—Specifications against contracts for sheet bars continue to come out in good volume, but there have been no new tonnages sold this week, so far as can be ascertained. Billets and sheet bars are being held at $21 and $22, Youngstown and Pittsburgh, although material is being shipped against old contracts at considerably less than those levels. Inquiries continue to come out for shipments of billets, sheet bars and wire rods to England, but no additional tonnages have been sold in the open market at this center the last fortnight. Wire rods are named at $26, Pittsburgh.

Slight Improvement

Ashland, Ky., Sept. 14.—Business is a little better as orders have shown a slight increase during the past week and the feeling in the market is more optimistic. Billets are now firm at $20.50 and wire rods at $25.50, both Ashland basis.

All departments at the plant of the De Forest Sheet & Tin Plate Co., Niles, O., were shut down Sept. 4, when one of the main steam pipes burst. The mills resumed operation Sept. 8.

Many Structural Shops

Have Very Little Business—Financial Conditions Cause Projects to be Held Up

New York, Sept. 15.—The slump in the structural steel market noted recently and attributed to unfavorable financial conditions, is portrayed sharply by the report of the Bridge Builders' and Structural Society for the month of August, given at its meeting at Philadelphia, Sept. 11. During the month of August, but 27½ per cent of the capacity of the bridge and structural shops of the country was contracted for, according to the reports of the society. This compares with 68 per cent in July; 56½ per cent in June; 57 per cent in May; 88 per cent in April, and 76 per cent in March. August, accordingly, is shown to have been the poorest month in a long period. While one or two fabricators have been more favorably impressed with the larger tonnage recently offered in this district, this is not a general sentiment in the trade. So many projects are being held up indefinitely or are being delayed that conditions are regarded as very unsatisfactory. The backwardness of the market is being attributed generally to the financial uncertainties. Specifications to the mills are not as brisk as they have been. The shape market at New York remains 1.31c to 1.36c, delivered, or 1.15c to 1.20c, Pittsburgh, the lower figure applying to prompt business.

Battleship Shapes Are Asked

Philadelphia, Sept. 14.—The structural shape market is very flat on new business in this territory. Inquiry for new building projects is extremely small and the tonnage now pending for delivery in this or southeastern districts is light. Eastern shipbuilders have asked the mills for prices on 5,700 tons of structural shapes which apparently represent the requirements of one of the battleships to be bid upon next month. Some eastern mills still are receiving fair specifications, but generally there is complaint from makers on the scarcity of business and operations are declining. For early delivery, 1.30c, Philadelphia, or 1.15c, Pittsburgh, is being done, but the usual price is 1.20c, Pittsburgh, and on some lots where special conditions obtained, 1.25c, Pittsburgh, was paid.

Structural Market Dull

Pittsburgh, Sept. 15.—Uncertainty of the financial situation has brought the market for structural materials to a complete standstill, and no change in conditions is expected until the war fog lifts. One of the leading fabricators in this district reports that all the inquiries for material in this district do not involve enough tonnage to keep its plant busy 30 days. Structural shapes are being held at 1.20c, but no attempt to obtain $1 a ton above that figure for fourth quarter is being made.

Hungry for Business

Cleveland, Sept. 15.—There is yet no positive evidence that the price of shapes is being shaded below 1.20c, Pittsburgh, but structural shops are hungry for business and there is active competition in fabricating. The plans of the Lindner building, which will require from 900 to 1,000 tons of steel, will not be ready for a month or two.

Little Contracting at Chicago

Chicago, Sept. 15.—While specifications for the lighter weights of structural material are reported fair by several makers, yet the aggregate tonnage is not up to normal and it would not be surprising to sellers in the Chicago district to find the structural mills slowing down this week below the rate of operation of last week. Structural lettings in this city and the west generally were few, the largest being for 419 tons by the city of Chicago for a head house for No. 2 pier in the harbor district, the steel going to the Illinois Steel Co. Prospective business also is at a minimum this week.

CONTRACTS AWARDED.

Akron hotel, Akron, O.; 500 tons; awarded to the Massillon Bridge & Structural Co. Carnegie Steel will be used.

Columbia Heights viaduct, Akron, O.; 260 tons; awarded to the Riverside Iron Works.

Viaduct, Gorham Coal Co., Carroll, O.; 587 tons; awarded to the McClintic-Marshall Co.

Dunne building, 22 Clinton street, Newark, N. J., 700 tons, awarded W. B. Shafer & Co.

Station at Hartford, Conn., for the New York, New Haven & Hartford Co., 500 tons, awarded the American Bridge Co.

Power House for Columbian Mills, Inc., Minetto, N. Y., 400 tons, awarded an independent fabricator.

Miscellaneous bridge work for New York Central & Hudson River railroad, 800 tons, divided between the Fort Pitt Bridge Works and L. F Shoemaker & Co.

City of Chicago, head house, pier No. 2, harbor district No. 1, 419 tons, to North Works, Illinois Steel Co.

Columbia county, Ore., three 125 feet pony truss spans, 104 tons, to American Bridge Co.

Modesto irrigation district, steel flume, 700 feet long, San Francisco, 300 tons, to reinforced concrete contractor.

CONTRACTS PENDING.

Bids on mail and express building for New York Central Lines at New York, involving from between 7,000 to 8,000 tons, closed Sept. 12. Low bidder not announced.

Bids on 650 tons caisson plates for Panama Canal Commission closed Sept. 15.

Bids on about 4,000 tons fabricated material for coaling docks at Cristobal, Panama canal, will be opened Sept. 21.

Filter building for American Sugar Refining Co., Brooklyn, 1,500 tons. Bids being taken.

Mohawk Hotel, Schenectady, N. Y., 400 tons. Bids being taken.

High school, Frankfort, Philadelphia, 400 tons, bids being taken.

Hospital, Wilkesbarre, Pa., 300 tons. Bids being taken.

Colony Club, Sixty-second street, New York City, 1,000 tons. Bids being taken.

Section No. 2 of the Seventh-Lexington avenues subway extension, New York City, 3,100 tons. Bids received Sept. 15.

Highway bridge, Troy, N. Y., 1,500 tons, Phoenix Bridge Co. low bidder on steel contract and Fort Pitt Bridge Works low bidder on total contract, including sub-struction. No award made yet.

Essex power house for Public Service Corporation, Newark, N. J., 2,000 to 3,000 tons, plans being revised.

Loft building for Brooks Brothers Co., Forty-eighth street and Fifth avenue, New York City, 1,500 to 1,800 tons. Plans being revised.

Bridge for Baltimore & Ohio railroad over the Allegheny river near Pittsburgh, 8,000 to 10,000 tons. Bids taken Sept. 14.

Machine shop for Atlantic Coast Line, at Waycross, Ga., 400 tons. Bids being taken.

Ames building, Cleveland, about 500 tons. Bids being taken.

Coal piers at Charleston, S. C., 500 tons; bids being taken.

Waterworks construction, Atlantic City, N. J., 450 tons of steel sheet piling; bids being taken.

(For complete prices see page 560)

Coke Market

Is Almost Lifeless — Slight Increase in Production

Pittsburgh, Sept. 15.—The market for furnace and foundry coke is quieter than it was a week ago, if such a condition is possible. There is no demand, either for spot or contract coke, and prevailing quotations are considered nominal. Operations in the regions have held their own satisfactorily, although decreased production is predicted. The *Connellsville Courier*, for the week ending Sept. 5, says production was 267,870 tons, an increase of 6,197 tons compared with the week before.

Small Lot Sales

Cincinnati, Sept. 15.—The coke market shows no tendency to change and transactions have been barely noticeable during the past week. Sales are mostly for small lots of foundry coke to fill in on old requirements and are usually for spot shipment, in order to take advantage of concessions granted for prompt deliveries. Demand for furnace coke is at a minimum.

Openings for American Products

In Great Britain—Many Workingmen Enlisting in the Army—Some Startling Advances in Prices

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Sept. 4.

WHILE there is less excitement than prevailed a week ago, the tone is more confident. Every financial report shows a strengthening of the position, and this no doubt has had an effect on the general disposition to do business. The weekly return of the Bank of England yesterday shows that gold reserves have increased, the stock of bullion now being £47,500,000 an increase of £4,500,000 on that of a year ago. In fact, it is considered that the resources of the Bank are more or less normal for the time of the year, although its liabilities are exceptionally heavy.

War conditions do not prevent a good deal of business being transacted. The Midland position in the matter of pig iron is better than in the north, although the Cleveland market has shown some recovery during the past few days. Speculative elements have been at work in Cleveland to a greater extent, but prices have recovered there a little, and now stand at 51s 6d ($12.36) with 51s 10d ($12.44) one month and 52s 5d ($12.58) three months. The amount in store is 93,000 tons. That market has been affected largely by the stoppage of European shipments.

Prices are very different in Birmingham where quotations yesterday were as high in some cases as 64s ($15.36) for Northampton and 65s ($15.60) for Derbyshire. Probably business could have been done 2s (48c) below this, but the smelters are no longer seeking orders, being booked generally up to November next and fairly confident of getting still better prices then. Forge iron was in excellent request, and prices are consequently stronger than for foundry. A furnace for cold blast iron and two for forge iron production are to be blown in this month in the Staffordshire district.

The improvement is equally manifest in steel making irons, especially in the Barrow district. Arrangements are being made to bring more furnaces into blast. Prices are still rising. Mixed Bessemer numbers are quoted there at 75s ($18) net. f. o. b. Stocks of iron have been reduced in that district, and now stand at 3,000 tons, representing a clearance since the war of 1,000 tons. There is every prospect of increasing demands upon the furnaces. Substantially, the same conditions apply to Scotland where business is booming, the Scotch plate makers having benefitted most from the withdrawal of continental competition. Fuel is slightly dearer, largely because the government control of the railways for troop transit has prevented fuel being cleared away from the collieries. The next six months, it is thought, will be a period of rather dear fuel.

Finished Iron and Steel

The finished iron trade presents a striking contrast to the conditions before the war, every department showing great strength, with rising prices. Some of the new business is directly due to government contracts, but the principal element is the withdrawal of foreign competition.

The Black County Iron Works, especially those making gas strip, are flooded with orders. Some, in fact, have been obliged to refuse orders from customers unable to wait for a couple of months. The difficulties have been added to by the enormous recruiting movement which is taking about 20,000 a day throughout the country from all trades. Among the recruits are puddlers, rollers, and other skilled workmen. Very serious inconvenience has been caused by this withdrawal. The gas strip mills have now enough work on their books to keep them employed until Christmas. The makers of bedstead strip are also very well off, partly on account of very good orders for camp bedsteads. The large demands for nuts and bolts in connection with shipbuilding have brought good orders here, especially as these nuts and bolts have now to be made of British iron instead of Belgian or German cheap steel. For fine hoops formerly supplied from Germany, makers now have to pay rather smartly to the Midland mills.

The price advances are in some cases startling. Before the war, galvanized sheets were £10 15s 0d ($51.60). The lowest figure quoted yesterday was £14 ($67) but some well-placed firms are quoting up to £15 ($72). This rise has resisted the effect during the past week of somewhat better supplies of spelter. But of spelter, a very strict record is insisted upon by the government, and everyone having stocks, however small, must supply particulars. The authorities have now placed galvanized iron on the export prohibition list, as they may want all the material for military purposes. The home demand for sheets is chiefly from agricultural districts for rick covers. There should be an opening now for American sheet makers to get a good share of the galvanized sheet export business.

Steel prices are generally somewhat higher. This applies especially to half-finished steel, which must now be got at home. Makers of wire rods ask £8 5s 0d ($39.60) for basic and £8 15s 0d ($42) for Siemens-Martin, which is £3 ($14.40) above the price at which German material was bought before the war. Birmingham makers have made several inquiries from America for cheaper material, but so far have not been able to buy advantageously. They will be glad enough to buy as soon as American steel offers any advantage. Wire drawers are working mainly on new business, which they can just manage to make profitable, as standard wires have now been made £10 15s 0d ($51.60). They will do as little as they can on old contracts, which have become unprofitable. The small wire workers who are working on old contracts and buy their material from hand to mouth, are in a sad plight, some working actually at a loss.

Yesterday there were advances of 2s 6d ($.54) on steel angles and sections and 5s ($1.20) on boiler plates. Best tinned plates are £2 ($9.60) higher than they were, and are in very good demand. Small bars and sheet bars and sections are very much wanted. The only quiet line in steel is rails, but the works look forward to great activity until the end of the year in steel generally.

A typical result of the war is the cost to makers of nuts and bolts of South Staffordshire iron selling at £7 12s 6d ($36.60) as a substitute for Belgian bars formerly obtainable at £5 8s 0d ($25.12) to £5 10s ($26.40) per ton.

The tinplate trade continues rather quiet, but makers are doing their best to find a little work for the employees rather than send them adrift.

The scarcity of alloys continues a serious matter and a number of Sheffield makers of crucible steel have had to close down for want of tungsten. There is also a scarcity of chrome, but this is not so serious and some supplies can be got from France.

Glenn Charles Lott, vice president and general manager of the Struthers-Wells Co., Warren, Pa., died Sept. 10.

Col. Bope on Export Trade

Talks to Pittsburgh Foundrymen About Possibilities of Foreign Commerce

Pittsburgh, Sept. 15.—Because of complex conditions caused by the war raging in Europe, American manufacturers can not expect to immediately enjoy great export trade, Col. H. P. Bope, vice president and general manager of sales of the Carnegie Steel Co. last night told the Pittsburgh Foundrymen's Association, at the regular monthly meeting of that body at the Fort Pitt Hotel. The war has cut across channels of commerce so deeply, he said, that it is difficult to predict the trend of market conditions the next few weeks.

If the threatening war cloud that hovered over Europe for a considerable time had disappeared, manufacturers in this country would now be on the highway to normal prosperity, foundrymen were told. Fundamental conditions last spring were sound, Col. Bope explained. Early crop reports indicated record breaking harvests, stocks of all kinds were low, and the nation appeared to be gradually entering an era of sound prosperity. Only one cloud could be seen on the horizon at that time to check the return of normal conditions, and that was the condition of the railroads of this country, Col. Bope continued. He stated that some observers had claimed three-fourths of the railroads of this country were on the verge of bankruptcy. Something should be done, it was declared, to assist the railroads.

Col. Bope, who is a member of a joint committee appointed to build up South American trade for Pittsburgh interests, spoke with interest concerning the possibilities of export trade. Briefly, he told of the successful attempts that already have been made by some domestic iron and steel manufacturers to enter foreign markets.

Nearly all the neutral markets to which domestic manufacturers may ship are considered debtor markets, Col. Bope asserted, and many of the projects under consideration in those countries probably would have to be financed by American interests furnishing desired material. The markets of the world should be carefully studied, and the individual needs of buyers should be considered. Col. Bope said he believed domestic manufacturers not only could gradually build up trade in countries not engaged in war but he also said demand for American products probably will come from belligerent nations after peace has been declared.

At the beginning of his talk, Col. Bope paid a tribute to the military organizations of the United States, and particularly to the national guard of Pennsylvania, to which he is actively attached.

"We ought to pay more attention to the cultivation of good soldiers in this country," Col. Bope said after speaking of a recent inspection trip to the rifle range at Mount Gretna, Pa. "Citizen soldiery ought to be upheld and supported by the business men of our country, and employers should encourage the younger men to take an active part in the activities of our militia."

Will Explain South American Needs

In an effort to disseminate information regarding the trade opportunities in South America, among manufacturers and business men, the Lehigh Valley railroad, in a few days will start from New York City for a tour of various cities, a special train which will have as its passengers a party well versed regarding the commercial requirements of the Latin-American Republics. Among those to make the trips, will be W. S. Kies, manager of the foreign trades department of the National City Bank of New York City and his assistants; consuls of South American countries or their representatives, and others who have studied conditions in the southern continent. At the various stops which the special train will make, these men will explain the opportunities and needs of South America to manufacturers and business men. The first city to visit will be Easton, Pa. The remainder of the itinerary includes: Allentown, Bethlehem, Wilkesbarre, Pittston, Binghamton, Elmira, Ithaca, Geneva, Auburn, Rochester and the tour will end with a large meeting at Buffalo.

Emery Supply Not Cut Off

As a result of the European war, shipments of emery to manufacturers of abrasive wheels in this country were cut off temporarily, but advice has been received by the State Department from an American consul abroad that the steamer River Delaware sailed from Naxos, Greece, on Aug. 25, with 300 tons of emery, and the steamer Gilbert with a cargo of 950 tons now is bound for Philadelphia. A large part of this emery is consigned to the Pittsburgh Emery Wheel Co., Pittsburgh, whose plant is located at Rochester, Pa., and will be sufficient to take care of this company's requirements until July, 1915.

War Shuts Off Supply

The International Importing Corporation, Baltimore, which has been importing core oil for foundries from German manufacturers, now is planning to establish a plant at Baltimore for the making of this product, as its source of supply abroad has been closed.

METAL MARKETS

New York

Sept. 15.

The unexpectedly good arrivals so far this month, combined with the lack of interest shown by consumers, continue to depress the tin market. The price of spot now is around 31.50c, New York, while futures can be had between 30.50c and 31.50c. Arrivals so far this month totalled 2,047 tons and the 2,675 tons now afloat all is scheduled to arrive this month, thus providing an ample supply for the country for several weeks to come. It is likely that the price may go a little lower than at present but the tendency is to believe that the market is pretty near the bottom. From the inquiries now being received, leading sellers believe that as soon as the market develops a firmer tone, consumers will come in liberally for their requirements.

Leading producers of copper reduced their selling price on electrolytic the latter part of last week to 12.25 to 12.37½c, delivered 30 days, booking a fair amount of business at these figures. This activity, however, has disappeared and the market is quiet at the above-named level. Prime casting copper is quoted variously; good brands may be obtained at 12.12½c, delivered 30 days, and possibly less. Sellers of ordinary brands of prime lake continue to ask 12.50c to 12.62½c cash, with the inside figure freely obtainable. Calumet & Hecla is asking 13.37½c, cash, for its best brands of lake copper. There is very little business in Lake.

The lead market is very dull and somewhat weaker. Independent sellers offer to sell the metal at 3.70c St. Louis and 3.85c, New York, without, however, obtaining much business. The American Smelting & Refining Co. continues to ask 3.82½c, St. Louis, and 3.90c, New York.

There has been no further foreign demand, either for lead or spelter. There also is very little domestic demand for spelter, with the result that the price of this metal continues to weaken. Prime western brands now are obtainable freely at 5.35c, St. Louis, or 5.50c, New York, and these figures probably could be shaded.

The antimony market also reflects the dullness of the present situation. Due to the scarcity of buyers, prices have been weakening right along and now are quoted, on the basis of duty paid, New York, as follows: Cookson's, 12c; Hallett's, 11c; United States, 10c to 11c; Hungarian, 10c and Chinese and Japanese, 10c.

Aluminum is in such poor demand that the prices largely are nominal. No. 1 ingots for spot shipment are quotable at about 20c, Niagara Falls. On contract delivery, 19.50c, Niagara Falls, continues to be quoted.

Retrenchment

Still Being Rigidly Adhered to by the Railroads

New York, Sept. 15.—There is no improvement on the railroad side of the iron and steel market. Wherever a large expenditure is involved, slow progress is to be noted. The retrenchment remains very severe in railroad equipment in which the business being placed is insignificant and there is very little new inquiry. An eastern railroad is negotiating for 1,000 box cars and the Rutland railroad has placed 75 hopper cars with the Standard Steel Car Co. Locomotive orders are few and far between and leading builders report they have about as small a volume in sight as at any time in their recent recollection.

The rail market is at a low ebb. A new inquiry for 5,000 tons of standard sections for European delivery has come before eastern mills and other export matters are under negotiation, but sales are coming slowly. The Lehigh & New England railroad has placed a small tonnage with the Bethlehem Steel Co.

Severe Loss

Sustained in Receipts of American Locomotive Co.

How severely the railroad motive power industry of the country suffered from the retrenchment policies practiced by the steam transportation interests, is shown by the annual report of the American Locomotive Co. for the year ended June 30. Gross earnings of the company for the year were $29,987,438 a loss of $24,880,000 from the preceding year. Net earnings were $2,562,000, a decline of $4,264,000. After the payment of 7 per cent dividends upon the preferred stock, a surplus of $326,127 was shown for the year.

President W. H. Marshall in reviewing the year's operations, says that the value of new locomotive orders received in the year was $14,454,000 equipment to about 25 per cent of the company's capacity. The unfilled orders at the beginning of the year were $17,156,000. At the close they were $4,162,000.

"As is usual in a period of extreme depression," he says, "prices of locomotives were seriously affected. Such orders as were secured during the year were taken at a very small margin of profit, in some cases at practically cost, in an effort to keep the plant running. During the first half of the year the plants operated at an average of 67 per cent of capacity. In the last six months they operated at only 29 per cent of capacity. Early in the year the Rogers plant at Paterson was shut down, as were also later in the year the Pittsburgh and Manchester offices.

"During the year there has been made with gratifying results a constant effort to reduce expenses. As a part of such reductions drastic action has been taken in respect to the salaried forces. Although it is not possible to reduce the expense of such forces in exact proportion to the reduction in the volume of productive work without complete disorganization, the extent of economies in this direction has been greater and more promptly executed than in any previous period of depression."

During the year the accumulation of cash in excess of immediate needs was used to purchase municipal securities, and substantial sums were placed on time deposits. In connection with the liquidation of the automobile department there has been charged against the fund of $2,300,000 set aside for the purpose, $1,237,000.

Rehearing

Of Rate Case Prayed For by the Eastern Railroads

Washington, Sept. 16. (By wire.)—Basing their plea on an extremely serious emergency which they face, due to declining revenues and the European war, eastern railroads late yesterday afternoon formally petitioned the Interstate Commerce Commission for a rehearing of the 5 per cent case.

The petition says the roads in the central freight association territory are preparing as rapidly as possible to put into effect the increase allowed in that territory, and serious consideration is being given the recommendations and suggestions made in the decision for purpose of increasing revenue.

War Tax

Will Meet Vigorous Opposition in the Senate

Washington, Sept. 16. (By wire.)—The action of the House Democratic caucus last night in eliminating the proposed tax on freight from the war revenue bill will, in all probability, hasten the passage of the measure. The new bill is to be introduced in a few days and will follow the line laid out yesterday at the conference of House and Senate Democratic leaders with the President. Strong opposition, however, is indicated from the Republican side in the Senate when the bill reaches the upper house.

Pipe and Tube Market

Pittsburgh, Sept. 15.—Official announcement that some of the more important oil companies have increased operations to about 75 per cent of normal capacities has tended to relieve the situation for oil country goods, although uncertainty regarding the future continues to minimize activity. Manufacturers report there are no inquiries of importance before the trade, and no important orders have been taken, so far as is known. Boiler tubes continue weak and somewhat irregular.

Wire Specifications Fair

Pittsburgh, Sept. 15.—Specifications against contracts placed at $1 and $2 a ton under the present $1.60 price of nails continue to come out at a fairly satisfactory rate, but demand for wire for manufacturing purposes, which usually commands $1 a ton above the market for plain wire, is light. There has been no selling at the maximum prices, although makers report they are being quoted on all new business.

Foreign Demand for Wire

New York, Sept. 15.—Considerable inquiry for wire rods and finished wire products for export, largely for England, is being put before makers. Some of these matters now are productive of orders though these sales have not been extraordinary in the aggregate. The foreign business of the American Steel & Wire Co. is moving better and this producer has been booking some good lots for foreign consumers. The John A. Roebling's Sons Co., Trenton, also has taken some nice export orders for wire products.

Eastern Furnaces Go Out

Blast furnace operations in the east, already upon a much reduced scale, are being curtailed further. Three additional stacks, most of whose production has been of the merchant class, have been blown out within a few days. These furnaces include Warwick A at Pottstown, Pa.; Leesport, at Leesport, Pa., which has been on high phosphorus iron; and Musconetcong, at Musconetcong, N. J., which has been operated on foundry iron for the Singer Mfg. Co. Statistical reports for August of merchant furnace conditions in eastern Pennsylvania, show a sharp falling off, both in stocks and orders. In Virginia, one active Low Moor furnace is going out, leaving but four stacks now in blast, Oriskany, Allegheny, Pulaski and one Virginia Iron, Coal & Coke Co.

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

Walter H. Bryce, of McKeesport, Pa., connected with the engineering department of the Pennsylvania Steel Co., Steelton, Pa., has returned from Europe. He was at Odessa, Russia, when the war broke out.

J. C. W. Chipman, chief clerk for the Oliver Iron Mining Co. on the Marquette range, has resigned after 25 years' service, has been placed on the pension roll and will retire from active business life, at Ishpeming, Mich.

J. Rodgers Flannery, president of the Flannery Nut & Bolt Co., Pittsburgh, has been elected president of a commission organized to build up South American trade for manufacturing interests in that city. Several steel company officials are on the commission.

William H. Donner, president of the Cambria Steel Co., Johnstown, Pa., and recently elected chairman of the board of directors of the Pennsylvania Steel Co., Philadelphia, plans to reside near that city in the near future. Mr. Donner now lives at Pittsburgh.

Louis Kindling, president of the Kindling Machinery Co., of Milwaukee, has returned from a trip abroad, having spent most of his time in Berlin, where he visited his mother, who is 99 years old. Mr. Kindling expresses utmost confidence in an early and complete victory for Germany.

John J. Buttermore, president of the Catawba Coal Co., and George S. Connell, city editor of the *Connellsville Courier*, Connellsville, Pa., have purchased the Elizabeth mine of the Connellsville Coal & Coke Co., at Montana, W. Va. Operations will be resumed at an early date after an idleness of several months.

Theo. Hofeller, of Theo. Hofeller & Co., Buffalo, N. Y., old metal dealers, who left for a trip to Europe some time ago, has advised friends in New York that he was in Carlsbad when the war broke out between Austria and Servia. From Carsbad he went to Munich and from there to Lucerne, arriving there two days before Germany declared war on Russia. Mr. Hofeller expects to remain at Lucerne until the present situation clears up to some extent.

G. W. Blen, identified with the Pittsburgh office of the Bourne-Fuller Co., Cleveland, will leave that interest Sept. 15 to accept a position with the A. M. Byers Co., Pittsburgh, manufacturers of wrought iron pipe. He will be connected with the New York office, which is in charge of W. W. Weller. Mr. Blen is well known in the iron trade in Pennsylvania, having been in the sales department of The Bourne-Fuller Co. for four years, previous to which time he was in the operating department of the Jones & Laughlin Steel Co., Pittsburgh.

William C. Connelly, of Cleveland,

WILLIAM C. CONNELLY,
President of the American Boiler Manufacturers' Association

elected president of the American Boiler Manufacturers' Association of the United States and Canada at the 26th annual convention held at the Waldorf-Astoria hotel, New York, Sept. 1 to 4, has spent his entire business career with the D. Connelly Boiler Co., of which he is now president and treasurer. He attended Case School of Applied Science until his junior year. Then, owing to serious illness of his father, Daniel Connelly, who was proprietor of the Connelly Boiler Works, he left school and took a position in the plant as timekeeper, and filled every office position for a year or two. In 1905, the business was incorporated and W. C. Connelly was elected secretary and treasurer. In 1911 the death of Daniel Connelly, the founder and president, occurred and W. C. Connelly was then elected to the office of president and treasurer. At the 25th annual convention of the American Boiler Manufacturers' Association Mr. Connelly read a paper on "Shop Costs as Applied to the Boiler Manufacturing Industry", which pertained principally to the method of arriving at the overhead expense. At the recent convention, Mr. Connelly presented another paper on "The Correct Method of Obtaining Labor Costs".

William McClelland, New York, has been appointed chief engineer and S. P. Grace has been named assistant engineer for the Public Service Commission of New York, which, in conjunction with the New York Telephone Co., is arranging to make an inventory of the New York Telephone Co., one of the largest undertakings of its kind ever attempted. Mr. Grace, a past president of the Engineers' Society of Western Pennsylvania, was formerly chief engineer of the Central District Telephone Co. of Pittsburgh. The New York Telephone Co. has appointed a non-partisan engineering committee to have charge of its part of the appraisal, consisting of F. G. H. Paine, F. G. Gillette, S. Harrison Porter, Marshall Robb and Mortimer E. Cooley, dean of the college of engineering of the University of Michigan.

Plans Large Benzol Plant

The Benzol Products Co., of Frankfort, Pa., a subsidiary of the Barrett Mfg. Co., is preparing plans for the construction of a large new works for the manufacture of benzol. This company has been a manufacturer of this product for some time and its business now has expanded so widely that a large increase in capacity is necessitated. The outbreak of the war has influenced the company to push its plans.

The foundry of the Mowry Car Wheel Co., Eastern avenue, Cincinnati, has been acquired by the J. A. Fay & Egan Co., of that city. The purchasing company will remodel it to be used as a foundry in making castings for wood-working machinery.

World's Great Conflict May End

With America as an Important Factor, if Americans Are Wise, says Judge Gary—Splendid Services of Ambassador Herrick

Chairman E. H. Gary, of the United States Steel Corporation, who had been abroad for several months, returned to New York from Paris Sept. 12. While in Paris, Judge Gary was very active in the relief work for American tourists who had been embarrassed by the war conditions, and was chairman of the general committee. Judge Gary gave out an extended statement concerning some of the events which he witnessed in France, but modestly refrained from any mention of his own services to his countrymen. In part, he said:

"Statistics have been published showing the actual expenditures of the war amount to $40,000,000 daily; and this is perhaps conservative. As the indirect loss will be fully equal to the direct, the stupendous and immediate cost to the nations engaged is conceived. And the unfavorable effect upon the economical conditions of other nations, which will be realized sooner or later, is of great magnitude. The destruction of property aggregating billions of dollars in value will be felt throughout the entire world. Add to this the consequences of the awful destruction of human life, and it is understood how much we as Americans are interested in a speedy termination of the war. If nothing is done by this government or her people to minimize or neutralize her influence, she will be a potent factor in the solution of the world's greatest, deadliest and most expensive conflict.

"It is to be expected, because usual in times of war, there will be gross misrepresentations concerning the conduct of contending armies. Sometimes statements are made that are fictitious, and again representations, with some basis of truth, are enlarged beyond the actual facts. We should, I think, wait for thorough inquiry and positive proof before reaching conclusions.

Tribute to Herrick

"During all the trouble of the summer in Paris, the French people, including all public officials, exhibited towards all foreigners a hospitable and generous disposition. This must certainly be realized and appreciated. As for Americans in France, it may be said they were most fortunate in having the assistance of Governor Herrick, the American ambassador, and he has been ably assisted by the consul general, Mr. Thackara, and by all other officials in their departments. I had opportunity to know something of the work of Mr. Herrick. He was untiring in his efforts, devoting, on the average, at least 16 hours a day to the performance of his duties. His acquaintance with all the public officials of France and their confidence in him, together with his ability and experience and familiarity with the questions involved, enabled him to overcome every difficulty, to meet every emergency, and to secure assistance for Americans abroad where and as they needed it. No one of less experience, however able, could have afforded the protection and relief which Americans in France have enjoyed. And this has not been confined to France, for the Ambassador has secured railway trains, and cash, to cover necessities where and when needed, and other accommodations for Americans located in many other countries at the time of the outbreak."

Otis Mills

Placed in Operation—Will Make Plates and Sheets

The Otis Steel Co., Cleveland, has completed and placed in operation the first unit of its new Riverside Works, in the Cuyahoga valley. The plant comprises a 3-high 72-inch plate mill, three jobbing mills, one of the latter being the widest mill of this type in the country, and two cold mills. This unit of the new works will produce light plates and sheets down to and including No. 18 gage.

The equipment of these mills includes every facility for the production of not only common tank plates, but blue and box annealed, pickled, cold rolled and patent leveled sheets. Although this plant has been in operation only a few days, the announcement of its opening has met with a very satisfactory response in the form of orders and sufficient tonnage to operate to full capacity for several weeks.

The old plant of the company, which is now known as the Lakeside Works, continues in operation, producing all grades of sheared plates in gages ¼ inch and heavier, in all widths up to 144 inches.

The Pittsburgh Coal Co., Pittsburgh, has renewed operations at its Monongahela mine, near Monongahela, Pa., which had been idle several months.

Republic

Will Conserve Its Resources During War Period

New York, Sept. 16. (By wire.)—The Republic Iron & Steel Co. passed its quarterly preferred dividend yesterday. The company announces its desire to conserve its resources because of the unprecedented conditions due to the war.

The British steamer Graciana arrived at Philadelphia Tuesday from the east coast of England with 3,000 to 4,000 tons of ferro-manganese. This brings the week's arrivals and shipments nearest hand to about 10,000 tons.

Electrical Engineers

Hold Convention at Cleveland — Many Interesting Papers

Many interesting papers are found in the program of the Association of Iron and Steel Electrical Engineers, which is holding its eighth annual convention at the Statler Hotel, Cleveland, this week. The convention opened on Monday morning with a business session. The first professional session took place Monday afternoon and two papers relating to transmission problems were presented. The second professional session, Tuesday morning, was devoted entirely to a discussion of control apparatus for electric motors for iron and steel plants. Three papers, presented and discussed in a group, were "Application of Auxiliary Apparatus in Iron and Steel Mills," by Stewart C. Coey; "Magnetic Control Characteristics," by H. F. Stratton and "Alternating and Direct Current Magnetic Control for Auxiliary Motors," by W. O. Lum.

The discussion hinged largely on efforts which are being made to design accelerating switches so they will operate rapidly. Mr. Stratton pointed out in his paper that a slow switch could cause a total loss of time of over half an hour in a ten hour day. The discussion, however, brought out the fact that this loss may be more apparent than real in some cases, owing to the fact that in a reversing mill the time saved by a quick operating switch is wasted in waiting for the piece to return to the rolls, or in other ways. One of the speakers pointed out that the number of accelerating switches required depends almost entirely upon the motor characteristics. At the present time, he said, some electrical manufacturers are making 20 horsepower motors which may be started simply by turning the full line current through the machine, no special starting apparatus being necessary. Other phases of the control problem were taken up at the Wednesday morning session when a paper on "The Control of Induction Motors for Rolling Mill Drive" was read by Wilfred Sykes and G. E. Stoltz.

The local committee provided an interesting entertainment program, including visits to the ore dock of the Pennsylvania Railroad Co., the Lakeside Power House of the Cleveland Electric Illuminating Co., and the Nela Park laboratories of the National Lamp Works of the General Electric Co. The annual convention banquet was held at the Statler Hotel on Wednesday evening.

An exhibit of electrical apparatus is being held at the Statler Hotel in connection with the convention and interesting displays have been made by the Chicago Pneumatic Tool Co., Chicago; American Steel & Wire Co.; Detroit Fuse & Mfg. Co., Detroit; Roller-Smith Co., Bethlehem, Pa.; Julius King Optical Co., New York; D. & W. Fuse Co., Providence R. I.; Crouse-Hinds Co., Syracuse, N. Y.; Cutler, Hammer Manufacturing Co., Milwaukee, and The Electric Controller & Mfg. Co., Cleveland. An interesting display of photographs showing safety appliances used in connection with electrical apparatus around steel plants has been furnished by various subsidiaries of the United States Steel Corporation.

Peace Plan

Being Considered—Some Troublesome Questions Suggested

Denver, Sept. 14.—The president of the Colorado Fuel & Iron Co., the chairman of the Victor-American Fuel Co. and the president of the Rocky Mountain Fuel Co., to whom President Wilson addressed his letter of Sept. 5, proposing a three years' truce between the mine operators and the striking miners in Colorado coal fields, have written a letter to the President acknowledging the receipt of his proposition and stating that it will be considered at a meeting of all the operators to be held next Saturday. The United Mine Workers of America are holding a meeting at Trinidad, at which the President's suggestions are being discussed.

Both operators and miners are disposed to consider the proposition in a friendly spirit and it is hoped that an agreement will be arrived at. It is evident, however, that some modification of the President's plan will be necessary. The plan proposes that all striking miners who have not been found guilty of violation of the law shall be given employment by the employer for whom they formerly worked, or where the place of the employe has been filled, he shall be given employment as a miner at some other mines of the company. There are now 200 miners under indictment and only a few have been tried. It is doubtful whether the operators will consent to re-employ alleged murderers and others under indictment. If the operators' contention that they have over 10,000 men at work and the union's claim that they have over 8,000 men in their tent colonies are true, the peace plan would call for the employment of 18,000 men. As the maximum number employed has been only 12,000 to 13,000, the question is naturally asked —How, especially when the market is declining, can 18,000 men be employed? This and other questions must be answered before an agreement can be arrived at.

Hot Debate

Of Proposed Boiler Specifications — Some Leave the Room

New York, Sept. 15.—A large attendance and some excited discussion marked the hearing today held by the boiler specifications committee of the American Society of Mechanical Engineers in connection with the proposed boiler standard which it has drafted. In the first place, there was considerable objection on the part of certain speakers who contended that the committee, in preparing its specifications, should have consulted some of the other technical societies, such as the American Society for Testing Materials and the American Association of Iron and Steel Manufacturers. Secondly, there was objection to the manner in which the committee granted a hearing to the speakers; this became so acute at one time that the railway representatives left the room in a body.

To consider these complaints, the committee adjourned early this noon, and on reconvening this afternoon announced that it would take up each section of the code separately in receiving criticisms. The suggestions made today in regard to the code concerned chiefly the section on fusible plugs, some speakers contending that such plugs by all means should be embodied in the construction of boilers, while others believed the use of plugs only tended to make the firemen careless.

Oliver Kingsley Brooks, secretary and treasurer of the National Malleable Castings Co., Cleveland, died in that city Sept. 14, after a brief illness. Mr. Brooks was born in Cleveland May 21, 1845. Before the Civil War he entered a studio to become an artist, but the war prevented him from carrying out this plan. He went to the front with the 150th Ohio Volunteer Infantry. On his return to Cleveland he was associated with his father in the crockery business, and in 1881 became interested in the Cleveland Malleable Iron Co., which later merged with the National concern.

According to a dispatch from Youngstown, employes of the Youngstown Sheet & Tube Co., that city, will be paid bonuses early in October. Bonuses will be 3 per cent of the total yearly wage of each man eligible to participate in the distribution.

Electric Furnace for Pig Iron

Description of a Large Furnace of the Open Hearth Type in Operation in Norway

AT A recent meeting of the Polytechnic Association of Christiania, Norway, Dr. A. Helfenstein, of Vienna, a well-known inventor and metallurgist, read a paper on "Electric Furnaces", in which, after discussing the various features which characterize the processes in electric smelting furnaces and which closely influence their construction, he described a large electric furnace for smelting iron ore which has been installed at Domnarfvets.

On the basis of the experience gained with the large electric carbide and ferro-alloy furnace, Dr. Helfenstein and his assistants have turned their attention to the problem of manufacturing electric pig iron direct from iron ore, and the first furnace for this purpose has been erected at the Domnarfvets iron works in Sweden. The fundamental principle of this furnace has already been described. It is, however, necessary to point out that no shaft has been employed for the materials, as the main object has been to make the construction as plain and simple as possible. The furnace was in a way an experimental one, from which the furnace gases were drawn from a point as near as possible to that of their development. It is, however, by no means impossible that shafts may be employed for other furnaces in future.

The furnace was started in May, 1913, and has now been working satisfactorily from the start. It was designed for a capacity of 10,000 to 12,000 horsepower, and the conducting cables were dimensioned accordingly, although it turned out that in the long run it was quite impossible to get the above-mentioned amount of energy, for the simple reason that the power station at Domnarfvets was provided with generators the frequency of which was quite abnormal. The generators are working at 62 cycles, which for large quantities of energy causes a phase-displacement that far exceeds the permissible figure for a load of 10,000 horsepower. It was therefore decided to employ from 6,000 to 8,000 horsepower only, and it transpired that with this load, 120 volts between the phases and 26,000 amperes per electrode bundle, it was possible to limit the phase-displacement to 0.8.

The maximum output of pig iron per 24 hours was 65 tons, while the output per month varied between 1,200 and 1,600 tons. While charcoal was being employed as reducing material the average consumption of energy and materials was as follows:

Consumption of energy per ton of pig iron, 2,000 kilowatt-hours.

Consumption of charcoal per ton of pig iron, 750 to 1,000 pounds.

Consumption of electrodes per ton of pig iron, 15½ pounds.

The heat value of the furnace gases varied between 2,800 and 3,000 calories per cubic metre of gas. From this it may be seen that the results in respect of the consumption of energy are not so favorable as those achieved in the electrometals furnace, and the same may be said as to the consumption of charcoal, while that of electrodes is about the same as in the electrometals furnace, as it can be safely assumed that the consumption can be brought down to 11 pounds per ton of pig iron. This furnace has, however, on the other hand certain advantages as compared with the electrometals furnace, which are as follows:

The capital expenditure is considerably lower, viz., only about $13.50 per horsepower for the whole plant, while an electrometals plant of corresponding size would cost about $21.60 per horsepower.

The furnace gases possess a considerably greater value, as they are equal to 2,600 to 3,000 calories per cubic metre, while those in the elec-

FIG. 1—EXTERIOR OF LARGE ELECTRIC FURNACE

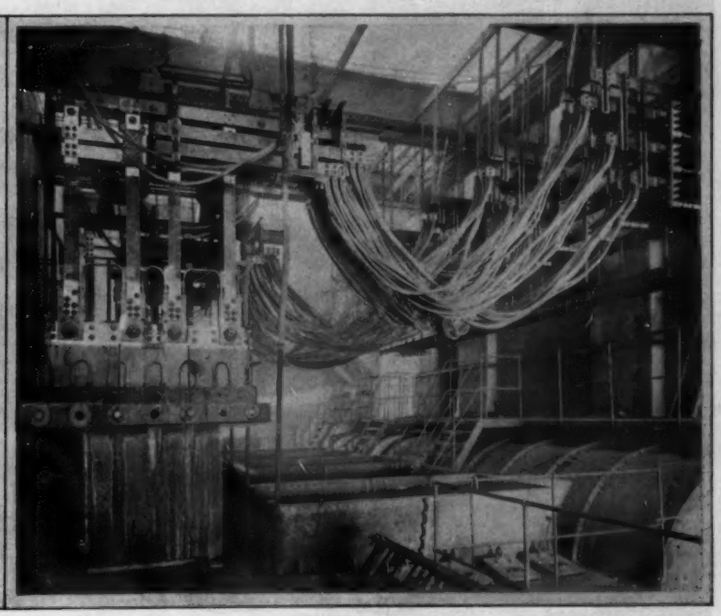


FIG. 2—CHARGING FLOOR, SHOWING ELECTRODES AND CONDUCTORS

For the illustrations and data included in this article we are indebted to the Foundry Trade Journal, London.

trometals furnace have only a value of 2,300 calories.

A pulverized ore can be employed without the working of the furnace being hampered in any way, and it need scarcely be pointed out that this is one of the greatest and most important advantages of the whole system. In the Domnarfvets furnace slag up to 70 per cent was in this way employed in the charge (without briquetting), but the process was not obstructed in any way. A trial was also made by adding 30 per cent of dust from the throat of the furnace to the charge, but even in this case the smelting process proceeded quite normally.

The number of attendants required for the working of the furnace is very small; a furnace with a capacity of 10,000 horsepower needs only seven men per shift, viz., three chargers, one to control the regulation and three men for the tapping.

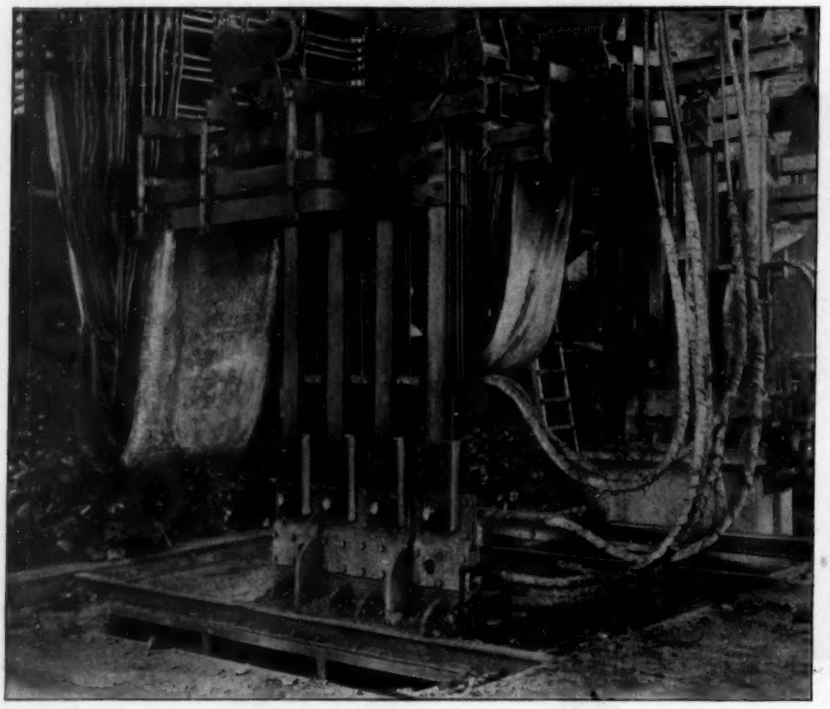


FIG. 3—ELECTRODES IN THE FURNACE

The furnace allows of coke being used as reducing material, and this is one of the most important points in the problem of the electrical production of pig iron. If coke is to be employed as a substitute for charcoal, there are two conditions which must be fulfilled. The tension in the smelting furnace must be lower, and the density of the current in the electrodes must be higher. The furnace gases must be removed after having passed through the comparatively thin layer of materials in the melting chamber. It is a peculiar feature of large furnaces that a higher voltage can be used than in small furnaces, no matter what the process in question is. This is also the case when coke is employed as a reducing medium, but the voltage cannot be kept on the same level as when charcoal is employed. With charcoal the furnace can easily be worked with 70 volts per phase, while this figure with coke must be reduced to 50 or 55 volts per phase. This is explained by the fact that coke is an excellent conductor.

It must, however, be added that the development in this direction is not to be regarded as terminated, and it is thus quite probable that the voltage can in future be raised considerably with coke as the reducing medium. The working with coke requires a higher density in the electrodes on account of the lower voltage and the higher weight of the ore per unit of volume. With charcoal the furnace can be run with a density in the electrodes of two to three amperes per square centimetre, while four or preferably five to six amperes per square centimetre are required with coke. Owing to these circumstances, and in consequence of the abnormal frequency of the electric generators at Domnarfvets it became necessary to reduce the load of the furnace to only 5,000 to 5,500 horsepower when coke was employed, but with this load there were no difficulties experienced with the working.

The second condition for the employment of coke is a speedy removal of the furnace gases. Low shafts are consequently desirable. They, however, have the drawback that the reducing power of the gases is imperfectly utilized. The consequence is that a gas rich in CO will be produced, while the consumption of energy and of coal will increase. It has thus been proved at Domnarfvets that the consumption of energy has risen to 2,400 kilowatt-hours per ton of pig iron, while the consumption of coke amounted to 750 to 810 pounds. As regards the consumption of electrodes, this was kept on the same level as when charcoal was employed.

In iron works which are only occupied with the manufacture of electric pig iron, the most natural solution of the gas question would be to connect the main furnace with rotating furnaces, so that the iron ore could be subjected to a pre-reduction by the aid of the furnace gases before entering the large furnace proper. This would, of course, effect a great saving in the consumption of energy, coke and electrodes per ton of pig iron produced. Also it can be used for open-hearth furnaces. The furnace gases at Domnarfvets are so employed now, and the gas pipes from the large electric furnace lead directly to the steel department.

Suction Lubricating Device

The Vulcan Engineering Sales Co., Chicago, is marketing a lubricator designed particularly for use on devices operated by compressed air. It operates on the suction principle. A chamber containing an absorbent is kept saturated from an adjustable large oil storage chamber which surrounds it. Air passing through the absorbent chamber becomes sufficiently charged with oil to lubricate the surface with which it subsequently comes in contact. The device can be attached to the air line in any position and will operate at any plane or angle. It also can be filled in any position.

Dr. Hans Goldschmidt, inventor of the Thermit process and president of the Goldschmidt Thermit Co., recently paid his annual visit to the United States for the purpose of keeping in touch with his numerous interests in this country. Professor Goldschmidt in addition to controlling the various thermit industries throughout the world, is one of the principal owners of the large detinning and tin smelting works of T. H. Goldschmidt, A-G, Essen Ruhr, Germany.

A Foundry Cupola of New Design

Heavy Duty Melting Furnace Built for Large Heats of Long Duration—Individual Blast Boxes Take Place of Windbox

BY G R BRANDON

THIS article will describe a new cupola designed with the special object of meeting the severest service requirements for large capacity and heats of long duration such as obtain in pipe and wheel foundry practice, and also in implement and machinery foundries of the largest output.

The development of this design has been gradual, the first cupola of this type of construction having been installed in 1908. To increase ease of handling and simplify the construction certain details have been incorporated. This design aims to avoid one of the greatest limitations for hard service in the ordinary construction, which is the location of the tuyeres all within the windbox. An individual blast box is used for each tuyere, similar to that used in Bessemer cupolas. This simplifies cupola operation greatly. The ordinary construction of wind box which extends to bottom plate also is done away with and a wind belt substituted.

Simple attachment of tap and slag spouts to the shell is also desirable in heavy duty cupolas and a design for the base which would be of ample strength and at the same time of simple and reliable construction was considered advisable.

The construction may be described as follows: The base consists of a heavy steel plate, square on the outside dimensions and with a circular opening in the middle slightly larger than the inside diameter of the lining. This plate is securely riveted to and supported by two steel H-beams at the front and rear. These beams are supported at the ends with cast iron cylindrical columns furnished with an ample base flange to rest on concrete foundation. The top flanges of the columns are machined so as to accurately fit the flanges of the steel beam, and are bolted thereto by bolts of large diameter.

An angle bar is riveted to unsupported edges of the bottom plate to give additional stiffness. A heavy angle makes the connection between the bottom plate and shell, and is securely rivited to both. This construction gives great strength as the circular shell is of such a form as to give maximum strength against buckling from vertical loads or internal pressure and is comparable to a girder of the height of the stack to withstand vertical loads.

The windbox is of belt form with all joints calked air-tight. The blast entrance is the tangential type which introduces the air into the windbox with minimum friction.

The blast boxes are cast iron with flanges for attachment to the shell and the underside of the windbox. These joints are fitted with gaskets and are air-tight. Each blast box is provided with a peephole and cover opposite the tuyere. Also, a frame with a fusible or combustible insert is attached to the underside of each tuyere to serve as a safety device in case slag or metal over-flows the tuyere.

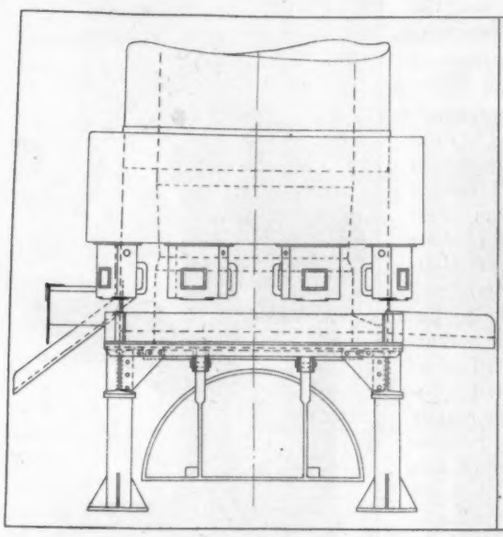


FIG. 1—ELEVATION OF HEAVY DUTY CUPOLA

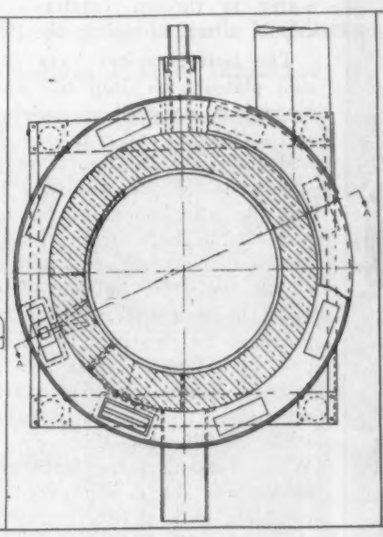


FIG. 2—HORIZONTAL SECTION

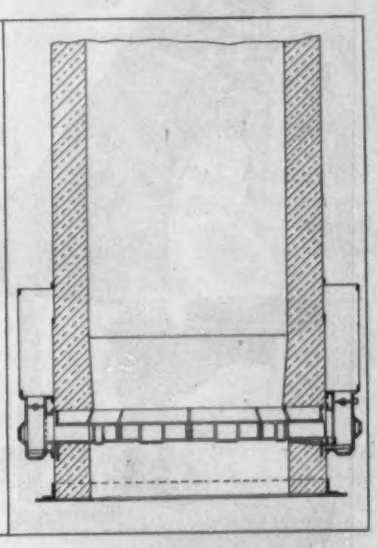


FIG. 3 — SECTIONAL ELEVATION THROUGH OPPOSITE BLAST BOXES

Each blast box is also furnished with a damper for regulating the amount of air passing from the windbox to the tuyere. The tuyeres are in one row and form a continuous inlet from the shell to the inside of the lining. The tuyere castings are made in segments with a removable top all bolted together through flanges and are of rigid construction.

The top has a flange at the inner edge, extending upward and inwardly and the lining is projected to come flush with inside of flange. The diameter of the lining at this point being 2 to 3 inches smaller than at the melting zone, to which point the lining is gradually sloped.

The stack for this cupola is of heavy construction, and all the joints are riveted. Supports are furnished at

A paper read at Chicago convention of American Foundrymen's Association. The author, G. R. Brandon, is vice president and general engineer, Whiting Foundry Equipment Co., Harvey, Ill.

proper intervals for the lining and an angle is placed around the top.

Two charging doors are provided and when desired these doors are of the lifting type, operating in vertical guides, counterweighted and fitted with an apron attached to the shell to serve in connection with a charging machine. Special doors may be installed for any method of power charging.

The lining recommended consists of blocks 6 x 9 inches wide and 6 inches thick, forming an inner lining, backed by regular square and arch firebrick set edgewise against the shell.

The tuyeres are of such form that it is not necessary for the bricks to

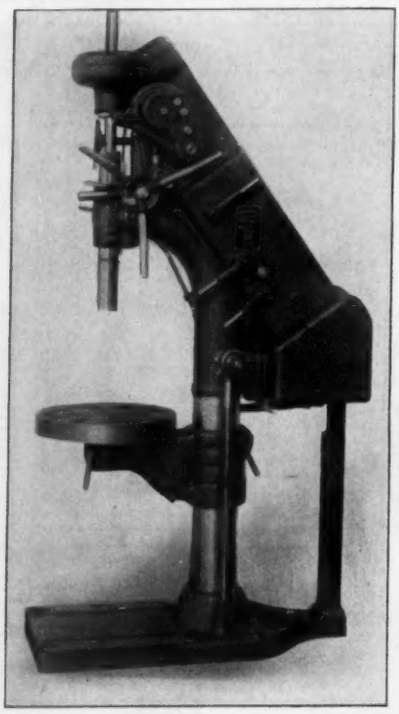


FIG. 1—SELF-OILED ALL GEARED DRILL

fit around individual tuyeres and the lining is easily laid at this usually difficult point. This saves at least a day's time in relining.

Among the principal advantages of this new construction is the arrangement of the damper in each blast box, which enables the attendant to readily control lighting up and burning through the bed, which must be burnt through evenly before last of the coke is put on and charging is commenced to obtain the best results. Or, in case the cupola is melting badly and great oxidation is taking place at one point, which can be noted at the charging door, the individual blast gate gives the operator a means of overcoming the improper working condition. Also, by proper regulation of the dampers, unequal cutting of the lining is prevented.

Another superiority is due to the arrangement of continuous annular tuyeres in combination with liberal size peepholes which permit inspection of practically the whole interior of the cupola and of reaching every part with a poke bar if necessary. The inwardly extending flange on the tuyere cover causes the molten metal and stock to descend clear of the tuyere opening and insures full admission of the blast. The area of the tuyere opening at the inside of the lining is very liberal.

The design of the base with the square bottom plate and columns located at the corners gives clearance for the bottom doors and for the cupola tender in cleaning out the drop and daubing up. With a steel base plate there is less danger of cracking as in the cast iron construction when water is thrown carelessly on the cupola after dropping the bottom.

The bottom doors have perforated cast plates with deep ribs and heavy hinge lugs, designed specially to equalize shrinkage and withstand heating and cooling. The doors are provided with pads for props and are arranged for the attachment of bottom door hoists. The lugs for the bottom door pins are structural steel and are bolted to the steel bottom plate.

An important feature in large cupolas is the provision for an operator's and tapper's platform of convenient height and substantial construction. This design of base readily lends itself to this construction. While I admit some features of this design are old, it is claimed that the combination is new and affords facilities seldom brought together for convenience, safety and efficiency in cupola operation. The cupola was designed by the Whiting Foundry Equipment Co., Harvey, Ill.

Self-Oiled All Geared Drill

The 20-inch all geared drill manufactured by the Barnes Drill Co., Rockford, Ill., is shown in the accompanying illustrations. The drill is of heavy construction and with the self-oiling system with which it has been equipped, embodies every element contributing toward mechanical efficiency. This drill has eight changes of gear speeds and eight changes of gear feeds, all of which are under the instant control of the operator from in front of the machine. It handles high speed twist drills from ¼ inch to 1¼ inch. All of the gears are completely enclosed to meet every modern safety requirement. The frame is provided with a back brace, giving it exceptional rigidity. The spindle is counterbalanced and the nose is extended to bring the drift hole below the sleeve. The graduation on the sleeve is in both inches and millimeters The transmission gears are located on the diagonal shafts. Any of the speed changes can be obtained without stopping the drill simply by operating the proper shifting lever. All of the back gears are operated by a small lever also accessible from the front of the machine and easily engaged or disengaged while the tool is running. All bearings excepting the spindle sleeve and the cross spindles, are oiled automatically. Oil is pumped by a geared pump in the reservoir of the machine

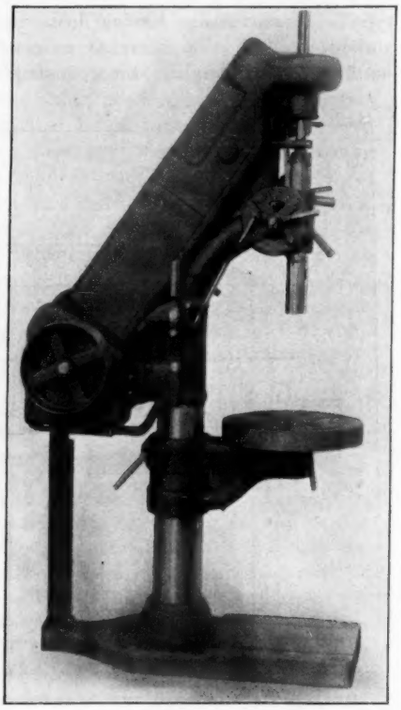


FIG. 2—LEFT HAND SIDE OF DRILL

and distributed to all parts, including the crown gears and feed box.

For tapping the friction clutch gears give reverse speed of 1¾ to 1. These gears are on the driving end of the machine. The drill has automatic reversing mechanism.

For the 20-inch drill, specifications are as follows:

	Inches.
Height of drill	70
Distance from column to center of table	10¼
Max. distance from spindle to table	26¾
Max. distance from spindle to base.	42
Diameter of column	5¾
Diameter of table	16
Diameter of spindle	1 7/16
Diameter of crown gear	7⅜
Diameter of crown pinion	4
Vertical travel of spindle	10
Vertical travel of table	16
Ratio of back gears, 4 to 1	
Size of tight and loose pulleys	10 x 3
Speed of tight and loose pulleys	400
Floor space (exclusive of T. & L. pulleys, which over-hang 7 in.	37½ x 16

Fig. 1—McMurray Door, Showing Retaining Points for Lining

Fig. 2—Two Ways of Sealing Beehive Oven Door, the McMurray Door Shown at the Left

New Equipment for Coking Ovens

Recent Improvements in Connellsville Regions Include McMurray Door, New Daubing Clay and Mechanical Door Extractor

SEVERAL improvements in horizontal and beehive coke oven equipment have been introduced recently in the Connellsville regions in Pennsylvania. These include the McMurray cast iron door, a patent clay for filling and daubing oven doors and a mechanical door extractor, each of which has a number of interesting features.

It has been customary to line coke oven doors either with fire bricks of special shapes or with blocks. The McMurray door, developed by William McMurray, superintendent of the Mount Pleasant Coke Co., Hecla, Pa., is made of cast iron with projections on the inside, which serve as retaining points for a fire-clay daubing mixture. This door is illustrated in Fig. 1. Doors weigh between 500 and 600 pounds, and can be installed with trolley arrangements for handling. The H. C. Frick Coke Co. has installed a number of these doors at its Lemont No. 2 works.

FIG. 3—CAST IRON DOOR MADE IN TWO SECTIONS

For rectangular oven practice, the McMurray door is cast in four sections, because of its size and weight. The door swings on hinges set in the oven wall. For hand and machine beehive ovens the door is made in two sections, with the top dropping back on a hinge for leveling, although doors for machine leveling through the trunnel can be cast in one section.

In developing the cast iron door, Mr. McMurray found the usual mortar from loam, clay and ground brick gave only a few months' service. J. R. Campbell, chief chemist for the Frick company, became interested in the McMurray project, and developed a plastic clay daubing mixture which he claims has proved satisfactory for lining a door of this type. The clay, it is stated, is adaptable to other

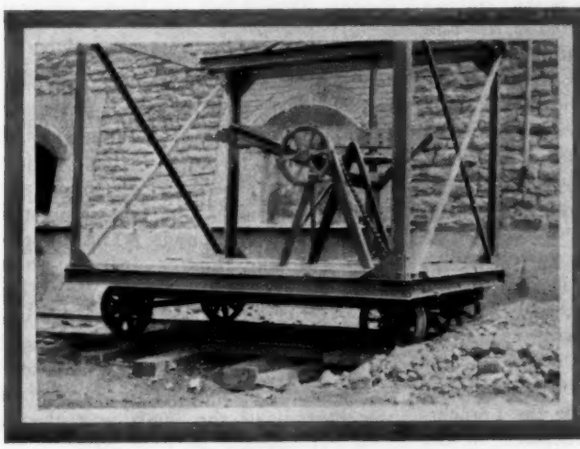


FIG. 4—STAUFT DOOR EXTRACTOR

FIG. 5—STAUFT COKE EXTRACTOR

types of mechanical doors, including those of by-product coke ovens. The mixture, patented under the name of Campbell's Plastic Clay Mixture, contains high grade refractory material of flint and plastic nature, and will withstand high temperatures without cracking, according to Mr. Campbell. The right of manufacture and sale of this mixture has been granted the Harbison-Walker Refractories Co., Pittsburgh.

The material is shipped in its plastic and tempered state, ready to be applied to the door. It must be well tamped in the frame, and if possible, the door should be allowed to thoroughly dry before being placed in service, although manufacturers say the door may be swung into position while the clay is "green", if ordinary precaution is used. When storage of the clay mixture is necessary, it should be buried in a pit, sprinkled occasionally with water and covered with a wet brattice cloth. Fig. 2 shows two methods of sealing beehive oven door.

Reports of tests conducted by Mr. Campbell indicate that the lining will last one year, and it should serve two or three years, it is said, with a few minor repairs. Six and a quarter minutes can be saved by the use of the McMurray door and plastic lining, according to Mr. Campbell, over ordinary brick lining, and it also is said that the introduction of this combination will effect a financial saving in beehive oven practice. It is pointed out that another advantage of the clay described is that it reduces to a minimum air leaks through the oven doors.

Another interesting improvement in oven practice in the Connellsville fields is the Stauft door extractor, Fig. 4, in use by the Taylor Coal & Coke Co., Uniontown, Pa., to remove the McMurray door. The machine is the invention of D. B. Stauft, general manager of the Taylor company. The door extractor consists of a jack on a truck, which runs ahead of the coke machine. The door is mechanically swung out, and then placed on supports at either side of the oven door. Mr. Stauft has developed a coke extractor, bearing his name, and a truck for watering several ovens at one time. The coke extractor is illustrated in Fig. 5.

Behavior of Iron in Some Alloys

A MASS of information of great scientific importance concerning the manufacture of both high-speed and structural steel was placed before the members of the Institution of Mechanical Engineers at a meeting held in London recently. Professor J. O. Arnold, of the University of Sheffield, and Professor A. A. Read, of the University of Wales, presented a paper on "The Chemical and Mechanical Relations of Iron, Tungsten and Carbon, and of Iron, Nickel and Carbon". The paper embodied the results of research work carried on at the University of Sheffield, supported by a grant-in-aid by the institution. Sir H. Frederick Donaldson, president of the institute, was in the chair.

The authors have been engaged in such researches for many years, and in speaking of the importance of the work, they pointed out that, "For example, a complete scientific knowledge of that remarkable alloy called high-speed steel cannot be obtained until the manner in which the carbides exist and behave therein is elucidated." It is intended to follow up the present paper with one on the carbides of molybdenum and cobalt, the research for which has also been made possible by the institution's grant. The elements dealt with are of great importance, as tungsten forms the basis of high-speed steel, and nickel is a vital component of many structural steels.

The authors first described very exhaustively, the results of tests on a series of tungsten steels. The steels were manufactured in the ordinary way in the experimental steel works of Sheffield University by the White crucible process with coke fuel. The materials used were Swedish bar iron, charcoal and metallic tungsten. The ingots, weighing about 40 pounds each, were cast into 2¾-inch square molds and were forged into 1-inch round bars.

A consideration of the results of the analyses of the carbides indicated that in many cases practically the total amount of carbon in the steel was obtained. In some cases the slightly lower results were partly accounted for by a slight roughness of the bars, which prevented the last traces of carbide being recovered. In the steel containing 0.7 per cent of carbon and 9.74 per cent of tungsten, nearly the whole of the iron carbide disappeared, being replaced by a carbide of tungsten corresponding closely to the formula WC, which theoretically should contain tungsten 93.88 and carbon 6.12 per cent.

Action of Tungstide of Iron

In higher ranges of steels containing 14.96, 21.15 and 26.29 per cent of tungsten, it was to be noted that as the tungsten rose the carbon fell and the iron rose. This fall in carbon, the reappearance of the iron in the carbide residue, and the remarkable increase in the weight of the residue yielded, at once led the authors to suspect the presence in the carbide of tungsten of a stable tungstide of iron. Numerous experiments with various reagents were made to try and separate this tungstide of iron from the carbide, but without success. The results obtained by increasing either the strength of the hydrochloric acid or the current density showed that the only effect was to reduce the percentage of total carbon obtained in the residue, without altering the composition of the latter.

Dismissing the effect of tungstide of iron in practical steel metallurgy, the authors said: "In crucible steel-melting operations at Sheffield University, having for their object the preparation of ferro-tungsten, the existence of tungstide of iron raised difficulties on account of its high specific gravity, which rendered the preparation of a homogenous alloy almost impossible in the crucible.

"In making very pure 40 to 50 per cent ferro-tungsten, from metallic tungsten and Swedish bar iron, there is always a fluid portion which teems easily, and a liquated portion at the bottom of the crucible which it is almost impossible to pour owing to its higher freezing point. It remains in the crucible in a pasty condition, and when cold is drilled with difficulty by a special drill which easily drills the hardest chilled white iron. Therefore its hardness approximates to that of felspar, namely, six on Moh's mineral scale."

They gave a table containing an example of this phenomenon. The fluid and relatively low freezing-point alloy contained 38.2 per cent tungsten and weighed 14½ pounds. The higher freezing-point metal, which would not pour, contained 52.3 per cent tungsten and weighed 13 pounds. The composition of the higher freezing-point metal approximated to Fe_3W. This unavoidable liquidation rendered it impossible for a big bar of high-speed steel—made, say, from a 2-ton ingot—to be homogeneous. The tungsten at the bottom of the ingot was always

(*Continued on page* 560b)

The Economics of Motor Drive

How the Application of Electric Motors Affects Profits in Business

BY H F STRATTON

PROFIT is the excuse for existence of industry. Profit is what you gain, but to have meaning or significance, profit must be measured in terms of some quantity instrumental in its creation. Considered as an insular quantity, profit is as indeterminate as a fraction with an unknown denominator. Profit may be variously compared; it may be known as a percentage of cost or sales, forgetting investment; more properly, it may be called the return upon investment.

Viewed fiscally, when the policy and management of an enterprise result in that balance which makes a maximum ratio of profit to investment, then, for that industry, capital is most efficiently employed. Viewed practically, the topic is infinitely more complex; most companies are not fortunate enough to know of the existence of enough articles, yielding maximum profit upon investment, to utilize capital already available; in fact, did any individual or any company possess such insight and knowledge, there would be practically no limit to the amount of capital which he could command.

The result is that we manufacture many articles of widely varying desirability from the view point of the relation of profit to investment. The profits on some articles are meager, compared with the investment in equipment necessary to convert raw materials into finished products; others are more satisfactory. In some cases, profit is made temporarily and artificially large by the failure to insure a reasonable presumption of the continuance of profit.

Is it possible, out of this maze of facts and conjecture, to seize any basic principles and codify them? If it is possible to find any laws governing the economics of machinery, any fundamental principles to guide one in determining what to build and what not to build, then in so doing, we touch upon questions of great economic and fiscal importance.

I must reluctantly abandon the pleasing generalities of this suggested train of thought, and confine the discussion to matters pertinent to the topic. The case I have attempted to establish is that the relation of profits to investment is very important because, as a matter of fact, it is the basic relation, which, when favorable, attracts capital, and which, when unfavorable, repels capital. This, indeed, seems such an obvious truism that it ought not need to be stated.

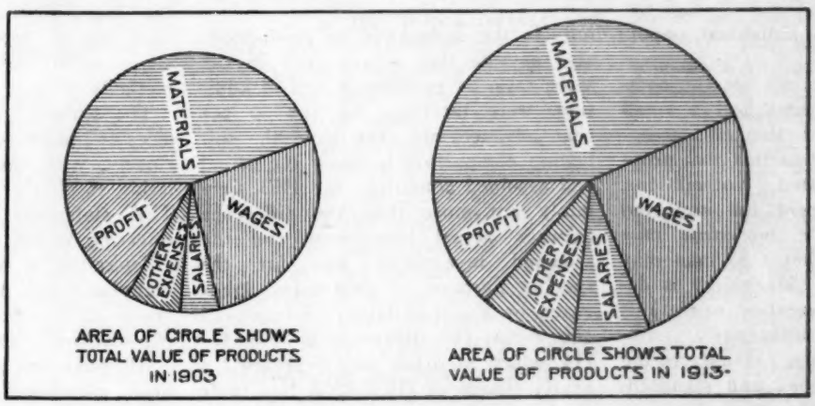


FIG. 1—INDUSTRIAL EXPENSES AND PROFITS SHOWN GRAPHICALLY.

I ask your indulgence if I attempt to discover, statistically and analytically, what has been the recent trend of progress in your industry. Unfortunately, the U. S. census reports do not deal with foundries alone, but group foundries and machine shops under one head, and the accuracy of any attempted deductions, to a certain extent, will be marred by this blending of statistics.

Table I is copied from an article by A. E. Rickards in *The Electric Journal*, and was deduced from the U. S. census reports.

Note that investment increased 91.5 per cent, output 53.8 per cent, and profit only 24.5 per cent. This is a diminishing set of figures.

Table II expresses profit and the elements of cost as a percentage of sales, for the years 1903 and 1913. Fig. 1 enables one to visualize the condition established by Table II.

Materials and wages decreased: salaries increased and the increase equals the sum of the decreases of material and wages. Miscellaneous expenses increased and profits decreased by the amount of the increase of miscellaneous expenses. Possible reasons for the increase in salaries and miscellaneous expenses are: *First*, increased selling expense due to more competition; doubtless much of this is non-productive and useless; unfortunately it cannot be stopped except by agreement which the government prohibits. Hence, so far as this factor is concerned, we have the spectacle of the government insisting that the cost of production shall be increased by insisting that selling competition shall persist. *Second*, increase in the number of foremen; increased supervision of men together with the use of more efficient machinery has probably helped make the favorable showing in regard to wages. *Third*, increased depreciation on increased equipment. *Fourth*, the establishment and maintenance of expensive cost systems; these have probably generally been good; the obviously bad cases are those where ten dollars are spent to save one dollar.

Having made this superficial study of the statistics of your industry, we are now face to face with the greatest problem of modern manufacturing. This is the triangular conflict between labor, investment and production. It is a battle maintained by an economic movement of terrific power, by the mental acumen of those who design the means for manufacturing and those who direct the operations of manufacturing, and finally by an expenditure, on the part of capital, of billions of dollars.

On one side, we see labor demanding and getting more wages, shorter

*Portions of a paper presented at the Chicago meeting of the American Foundrymen's Association.

hours, greater expenditures in the interest of safety and welfare. Unfortunately—it seems to me—we also see labor in certain industries protesting against the increased efficiency of labor; insisting that a man shall do, not what he can, but only what the average can; communistic mediocrity preferred to individual opportunity.

On the other side, we see the combined might of capital and a small army of specialized thinkers, struggling to increase production that profit may not be annihilated. Not millions, but billions are spent for improved equipment that the workman may produce more, or that a $3 man may displace a $4 man. Machinery is designed so that numerous operations are performed simultaneously, automatically and rapidly. Manufacturing operations are planned and standardized, speeds and feeds are specified, in order that output may depend, not upon the initiative of the workman, but upon the capacity of the machine. Material is routed to travel the least possible distance in its conversion from raw to finished products. The principle of the division of labor—detected and eulogized by Adam Smith over a hundred years ago—is carried to a degree of completeness, heretofore apparently impossible. Capital and brains are successfully consummating a condition where manufacturing operations are largely independent of the initiative and skill of the workman; with some truth, I might say, even of the intelligence of the workman.

Right or wrong, labor is increasing production costs if equipment remains unchanged. Right or wrong, the manufacturer is changing equipment to increase the capacity of the individual workman and to replace skilled by unskilled labor.

Through the courtesy of John Frey, editor of the *International Moulders' Journal*, and A. E. McClintock, commissioner, the National Founders' Association, I received figures indicating the following condition; from 1903 to 1913, the average wages of the workman in a foundry increased not less than 30 per cent. Assume that from 1903 to 1913, investment, salaries and miscellaneous expenses were increased only in the same ratio as production; also assume that wages grew in the same ratio as production and in addition, were increased by the 30 per cent advance; we then have the following comparison between the actual and assumed conditions for 1913. Certainly not more than the difference between actual investment and the assumed investment was for the specific purpose of decreasing labor costs, by the installation of improved equipment; this difference is $302,542,714, which at 6 per cent represents a yearly charge of $18,152,562. Not more than the difference between actual and assumed salaries and miscellaneous expenses, was devoted specifically to decreasing labor costs. In both cases, however, let it be said that the entire extra expense was incurred to hold down labor charges. On the same basis of reasoning, the saving in labor is the difference between the assumed and actual wages.

If it be conceded that the assumptions are substantially correct, the saving in labor costs is greater by nearly $26,000,000 than the extra expenses incurred to bring about this saving.

Be it admitted that the reasoning includes numerous errors; nevertheless, if the items could be more accurately divided and apportioned, I believe a larger saving would be indicated. For instance, it seems probable that any given laborer, performing the same work with the same equipment, would do less work per day in 1913 than in 1903 because he works less hours per day; yet the assumption has been made, that he would accomplish as much work. Again, I have definite knowledge that in several large typical industries, selling expense, expressed as a percentage of sales, has increased conspicuously during the last ten years; yet, the assumption has been made that selling expense increased only in the same ratio as sales, and the balance of salaries and miscellaneous expenses has been charged to the effort to decrease labor costs.

Therefore, it is indicated that, in the foundry and machine shops, it does pay to decrease labor costs by using labor saving machinery and methods.

The leading statistics of the foundries and machine shops coincide fairly closely, with the average figures relating to all classes of manufacturing. This statement may be verified by referring to the U. S. census reports.

Therefore, it is indicated, in general manufacturing, that it pays to decrease labor costs by using labor saving machinery and methods.

Although the electric motor has not been mentioned, the previous discussion is justified because the electric motor, probably more than any other machine, is universally and importantly identified with the struggle to combat increased wages with increased production. In certain factories—for instance, the steel mills—the wonderful machinery and methods of the day, would be almost chaotic without the responsiveness and controllability of the direct current electric motor.

From 1899 to 1909, electric power grew from 5 to 26 per cent expressed

Table I.

THE FOUNDRY AND MACHINE SHOP INDUSTRY—ALL ESTABLISHMENTS

Item No.	Item.	1903.	1913.	Per cent Increase or Decrease.
1	Number of establishments	11,180	13,414	20. inc.
2	Capital	$806,902,401	$1,543,558,607	91.5 inc.
3	Primary horsepower	463,231	889,212	96.5 inc.
4	Value of products	$833,627,841	$1,281,053,730	53.8 inc.
	Cost Items.			
5	Materials	$371,385,000	$ 552,431,000	48.7 inc.
6	Wages	224,553,000	328,369,000	46. inc.
7	Salaries	41,991,000	100,173,000	138. inc.
8	Miscellaneous expenses	57,295,000	129,336,000	125. inc.
9	Total cost	695,224,000	1,110,309,000	59. inc.
10	Total profit	137,401,000	170,743,000	24.5 inc.
11	Per cent profit on capital	17	11	54.5 dec.
12	Number of wage earners	436,293	542,587	24.3 inc.
13	Number of salaried employes	35,743	77,794	117. inc.
14	Average salary per salaried employe	$1,175	$1,287	9.65 inc.
15	Wage per wage earner	515	605	17.4 inc.

Table II.

COST AND PROFIT AS PERCENTAGE OF SALES.

Item.	1903 Per cent.	1913 Per cent.	Per cent Increase or Decrease.
Materials	44.6	43.1	1.5 dec.
Wages	27.0	25.7	1.3 dec.
Salaries	5.0	7.8	2.8 inc.
Miscellaneous expenses	6.9	10.1	3.2 inc.
Profits	16.5	13.3	3.2 dec.
Totals	100.0	100.0	

as a percentage of the total power used in manufacturing. In the last seven years, it is calculated that while the cost of living has advanced 37 per cent, the average cost of electricity has gone down 17 per cent. Samuel Insull states that due to economics brought about in the generation of electricity, it now requires only 40 per cent as much coal for the same output of electricity as it did ten years ago. Important and sufficient reasons have caused the spectacular growth and cheapening of electric power; this has not been due to any figment of the imagination or the persuasiveness and personality of salesmen. I think the situation may be summed up very simply by saying the electric motor was needed; hence its development and wide adoption.

I propose to lay before you in considerable detail, the various reasons which have made the electric motor an indispensable part of an important economic movement. More specifically, I shall endeavor to explain in what ways the electric motor has aided in the struggle to increase production and decrease dependence upon skilled labor.

Consider first the basic question of increasing the capacity of any given machine, say a lathe. What is the real working unit? Obviously, it is not merely the lathe, because one workman will do more and better work than another workman. Obviously, it is not merely the workman, because the same man will do more work on a good machine than he will on a poor one.

The important facts are these; the real working unit is the machine plus the average workman; the value of this working unit is gaged solely by the quantity of produced work which is good enough; and the efficiency of the operation is largely the degree of intelligent co-ordination between workman and machine.

It is not absurd to consider that the modern machine has functions that are almost human; when the stops, levers and gears are properly adjusted, the machine does the work, precisely and repititiously; the workman does the directing. Very appropriately, the machine might be called the worker and the man the operator. Hence, the operator should be furnished the utmost convenience and responsiveness to aid him in directing the machine. The properly controlled electric motor furnishes this link of convenience between operator and machine.

In this respect, an electric motor merely supplying power furnishes the least of the possible arguments for its use. It is not electric power, but rather controlled electric power that makes this subject so full of possibility and promise. It is the ability to make the electric motor perform flexibly and automatically the various operations necessary in high speed production. It is the responsiveness and power of the controlled electric motor that enables a workman to do more work with less fatigue. It is the elimination of useless thought, worry and physical exertion that permits a workman to bend all his energy and ability to his real task and to produce more and better work; and it is the blending of these qualities that furnishes the vital argument for the use of the electric motor. Too often we find the question of a few dollars of extra cost for power or machinery overshadowing the vital consideration of what effect the new equipment will have on production and labor costs.

Table V was deduced from statistics published in the *Electrical Review and Western Electrician,* and relates to three different foundries concerning each of which figures were tabulated for one year. Each of these foundries was pretty thoroughly equipped with the ordinary electric drive, and in each case the approximate number of men employed, and the approximate tons of metal cast per year, were known. The average of these three cases gives the cost of electric power as 2½ per cent of the cost of labor. The important deduction to be made is that any addition to the cost of electric power—even to the extent of doubling it—is relatively insignificant if, through its added convenience, only a small proportionate increase in production or decrease in labor cost is thereby secured.

Reverting to the motor-driven lathe as illustrative, recent developments in controllers have provided an equipment that starts, stops, or reverses the motor in the shortest safe time, merely by moving a small lever to different positions. The operator need give no heed to the manner in which these operations are performed. The controller does this for him, automatically and better than he could do it himself. With such an equipment the operator is free from much useless mental and physical exertion. His mind is concentrated on his real task, with the obvious result that he produces not only more work but better work. The R. K. LeBlond Machine Tool Co., a large manufacturer of lathes, before deciding to recommend and furnish such equipment as standard, made exhaustive trials of this apparatus in its own shops. The increase in capacity of the lathe, due to this modernized equipment, proved to be 25 per cent conservatively.

Table IV.

BALANCE.

Saving in labor costs		Expenses to reduce labor costs	
Wages	$120,602,268	Interest on extra investment.	$18,152,562
		Extra salaries and mis'c. exp.	76,807,132
Total	$120,602,268	Total	94,959,694
		Net saving	25,642,574
			$120,602,268

Table III.

Item.	Assumed.	Actual.
Investment	$1,241,015,893	$1,543,558,607
Wages	448,971,268	328,369,000
Salaries and Miscellaneous Expenses	152,701,868	229,509,000

Cut the Time Between Cuts

As a division of this topic, examine the process of stopping a machine automatically by dynamic braking—which merely means the temporary conversion of the motor into a generator—instead of allowing it to come to rest merely through the effect of its friction. On a certain motor driven boring mill, 24 seconds elapsed before the machine came to rest by drifting. With dynamic braking, the same machine was brought to rest in 2½ seconds. Wages, salaries, taxes and all overhead burdens, did not pause each time these 21½ seconds were wasted. E. P. Bullard, in a recent address, said: "What is the use of cuts at high speed, ripping things to pieces, and then losing all we gain because we cannot cut the time between cuts? To cut your cost properly, you must cut the time between cuts."

One of the most striking characteristics of the properly controlled elec-

tric motor, from the standpoint of efficient high speed production, is its ability to operate at widely varying speeds, in accordance with the work in hand, and its ability to maintain a predetermined speed with practical constancy. These characteristics, combined with the ease with which this speed control may be obtained, have opened up vast fields in the application of electric drive to an almost infinite variety of machines.

As an example, take the case of the air supply to a cupola. In the *Electrical Review and Western Electrician* for June 8, 1912, the following statement is made: "The steady melting of iron and the steady descent of the charge from the cupola are dependent on the maintenance of uniform conditions of air pressure." In a recent installation, at the plant of the Canadian Locomotive Co., Ltd., Kingston, Ont., the blower, supplying air to the cupola, is driven by an adjustable speed, direct current motor, the speed being varied by field control. On the wall in front of the cupola there are mounted a push button, a field rheostat and a draft gage, all located for convenient operation by the man standing on the tapper's platform. The push button is for starting and stopping the motor, and the field rheostat is for regulating the speed of the motor.

It is evident that the man on the tapper's platform not only can start and stop the motor easily, but he can very definitely regulate the speed of the blower and consequently the amount of air supplied to the cupola. This man's energy is directed entirely to the proper melting of iron. He need not worry about the condition of the air supply. If the draft gage indicates an insufficient supply he turns the handle of the field rheostat so as to increase the speed of the blower. And, moreover, he accomplishes the desired results with the minimum of mental and physical exertion.

The controllers for electric motors are not only simple to operate, but they may be located where most convenient and accessible to the workman, or where they will occupy otherwise wasted space. An example of this occurs in connection with motor drive and automatic starting and stopping as applied to sand mills in a certain steel foundry. The only laborers permanently employed on these sand mills are used for shoveling sand and certainly do not possess any knowledge of electrical machinery. The automatic starters are mounted on columns above the crane runway and the starting and stopping push buttons are placed on the same columns near the floor. The shovelers at the sand mills find it easily within the range of their willingness and ability to start and stop these motors by merely pushing buttons instead of possibly calling on an electrical man or foreman to perform these operations when needed. Easy control of machinery means less difficulty in finding the right man to operate a machine; witness the expensive, important electrically operated cranes of the steel mills, many of them in the hands of foreigners unable even to speak English. Not long ago at the Machine Tool Builders' convention, it was stated that it costs $35 per man to hire him, try him out, and fire him for inefficiency. As an important and unrecognized merit, let the properly controlled electric motor be credited with having made it distinctly easier to find the right man to operate a machine.

With electric drive, individual machines may be shut down when idle, power being taken only by such machines as are in active use; thus overtime work on a few machines, often a pressing necessity, requires only the operation of their respective motors, instead of the waste of power in a long train of shafting, belts and idler pulleys.

Another worth-while advantage of electric drive is the saving in space that may be accomplished and the possibility it presents of allowing machines to be placed to suit conditions of lighting, sequence of operations or easy accessibility to the supply of material. This, in over-crowded plants, often means the possibility of expansion without a heavy outlay in additional land or new buildings. Arrangements of machines to suit lines of shafting is extremely rigid. Electrically driven machines may be placed where desired, from the standpoint of the manufacturing needs. Moreover the arrangement is under no necessity a permanent one—electric drive means flexibility in location and relocation.

The elimination of overhead shafting often allows headroom for traveling cranes, making the handling and transporting of material quicker, safer and less expensive.

Electric motors and controllers can be enclosed and successfully operated in locations of excessive dust and dirt, moisture and fumes, an item of some importance in many shops.

The advantages cited thus far, relate chiefly to cases where a machine is driven by its individual motor, which is selected and controlled with particular reference to the peculiar operating characteristics of the machine. We next consider the motor merely as a source of power, driving the machinery partially or entirely in groups and using a moderate amount of belts and shafting.

The question arises whether electric power should be generated or purchased. Unquestionably, the amount and the proportion of purchased power is rapidly increasing. Inasmuch as this question has been coldly and carefully studied by eminent engineers and executives, it is reasonable to assume that in many cases, it is economical to purchase electric power. Statistics are given concerning the cost of electric power in seven foundries having their own plants, ranging in capacity from 50 to 773 horsepower and driven by both gas and steam engines. The average horsepower per foundry is 228. The average maximum demand per foundry is 141 horsepower. The average cost for producing this power is 3.34 cents per horsepower hour, while the average cost to buy this power at the rates prevailing in the district where the foundries are located, would be 2.02 cents per horsepower hour, a saving of 1.32 cents per unit or 39.5 per cent.

Most of the arguments against the use of electric drive are founded upon the increase in investment which is represented by motors and controllers. Generally speaking the investment in electrical equipment increases with the increase in the economies and conveniences secured by its use. Consider the following assumed installations which are progressively more expensive in first cost and more economical and safe in operation. *First,* the replacement of an engine by one

(*Continued on page* 560b)

Table V.

PROBABLE PAY ROLL

Tons per day.	No. of men.	Per year ($2.75 per day)	Tons per year.	Labor cost per ton.	Cost of electricity per ton.
5 to 10	40	$ 34,000	2,800	$12.15	$0.44
10 to 12	65	55,250	6,030	9.15	0.20
60 to 70	300	255,000	19,700	12.95	0.21
Average				$11.42	$0.28

Making Steel by Duplex Process

Description of New Open Hearth and Bessemer Departments of Pennsylvania Steel Co.

TONNAGE, until recently, was the watchword of the American steel industry, but in the past few years changing conditions have brought a new slogan into the foreground. The progressive steel maker today thinks first of quality and quantity is a secondary consideration. The necessities of high speed passenger traffic and heavy freight service on our railroads, the growth of the automobile industry, new demands on the agricultural implement manufacturers and other causes have combined to greatly increase the need for special quality steels of a uniform character, made according to certain specifications to fit individual requirements. As a result, a number of prominent steel makers have concentrated their resources on the production of special steels and in this field of endeavor the Pennsylvania Steel Co. was a pioneer.

For the economical manufacture of special steels, plant facilities of unusual flexibility are necessary and consequently the duplex process has proved particularly satisfactory for this class of work. As one of the first steps, therefore, in an extensive program of reconstruction and improvement at its Steelton works, the Pennsylvania Steel Co. has provided a new steel-making department that includes Bessemer converters, mixers and stationary and tilting open-hearth furnaces, so disposed as to permit the production of either straight Bessemer, plain open-hearth or duplex steel at pleasure.

The equipment of the new department includes two tilting basic lined 200-ton Campbell type open-hearth furnaces, an 800-ton iron mixer, two 25-ton acid lined Bessemer converters, a 400-ton iron mixer and six 90-ton basic lined stationary open-hearth furnaces, together with the necessary auxiliaries such as gas producers, ladles, cranes, charging machines, etc.

The works of the Pennsylvania Steel Co. is at Steelton, near Harrisburg, Pa., on the Susquehanna river. Steelton is one of the oldest steel-making centers in the United States. The Bessemer department of the company's works dates back nearly to the Civil War, the first blow having been made on May 25, 1867. A year and a half ago the company entered upon a period of reconstruction having in view the gradual modernization of all the plant facilities. The first step in this program consisted in extending the open-hearth department as described above. The general scheme of reconstruction will eventually include the mills, blast furnaces and miscellaneous departments.

The company's property consists of a long, rather narrow strip of land lying along the easterly bank of the Susquehanna river. The new open-hearth and Bessemer department has been placed approximately at the center of the works with its long axis parallel to the river. New blast furnaces, to be erected from time to time, will be built in a line east of and parallel to the open-hearth and Bessemer departments, thus facilitating the transfer of hot metal. The new steel-making department also is conveniently located from a switching standpoint. It is served both by standard and narrow gage tracks, the latter being used almost exclusively for handling ingots.

As suggested above, the new steel-making department has been specially designed with the object of securing the maximum flexibility of operation. The output includes all grades of carbon and alloy steels ranging in carbon from 0.05 to 1.5 per cent, and including nickel-chrome, titanium and manganese rail steel, and many varieties of high grade steel for automobile and forging purposes. A special grade of nickel-chrome steel made from Cuban ores commercially known

FIG. 1—TAPPING SIDE OF 200-TON TILTING OPEN-HEARTH FURNACES AT PLANT OF PENNSYLVANIA STEEL CO.

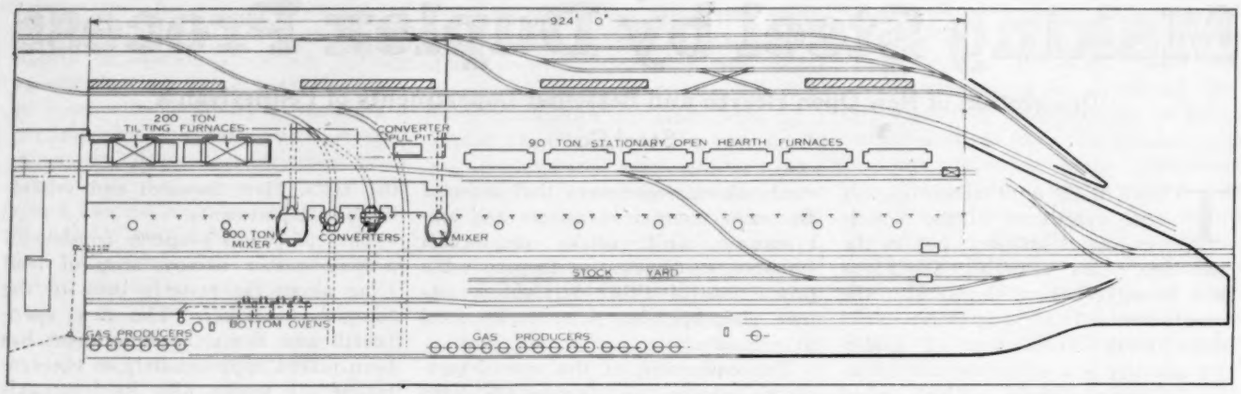


FIG. 2—GENERAL PLAN OF NEW OPEN-HEARTH AND BESSEMER DEPARTMENT OF PENNSYLVANIA STEEL CO.

as Mayari, or natural alloy steel, constitutes a large portion of the output.

Under ordinary circumstances the duplexing is carried out by operating the Bessemer converters in conjunction with the 200-ton tilting open-hearth furnaces. The arrangement is such that the converters are charged and poured from the same side and all the ladles are transferred direct to the furnaces by the overhead cranes. The entire plant is under one crane runway and this permits the stationary furnaces also to be used for duplexing, if desired. In addition, the straight iron and scrap process may be employed in the tilting furnaces, or combinations of each may be adopted with either type of furnace. Molten iron may be transferred from the mixers under the charging floor to the tapping side by electric buggies, thus permitting it to be used as a part of the charge in the furnaces or as a recarburizer in the furnace or the ladle.

The general arrangement of the various units is shown clearly in Fig. 2. The converters, it will be noted, are located between the stationary and tilting furnaces, the mixers being situated on either side of the converters. For the whole department there are two 60-ton Morgan and one 75-ton Alliance cranes with 25-ton secondary hoists which serve the charging floors of all the furnaces and the pouring side of the mixers and converters. The gas producer house is situated back of and parallel to the furnace building, the stock yard occupying the space between the two structures. The gas producers are arranged in two groups separated by the Bessemer dry house. The open-hearth and Bessemer building is 924 feet in length and 170 feet in width. The crane spans in the pouring bay, the open-hearth charging bay and the Bessemer charging bay are 65 feet, 72 feet and 22 feet 3 inches, respectively. The stock yard is 924 feet in length and 75 feet in width, the gas producer and Bessemer dry houses have a combined length of 684 feet, including the calcining department, and a width of 47 feet. The various structures are of the customary steel frame type.

The general arrangement of the 200-ton tilting open-hearth furnaces is clearly shown in Fig. 1, and the details of the tilting mechanism are shown in Figs. 13 and 14. Each furnace is 88 feet in length over-all, including gas ports and uptakes and the over-all width is 24½ feet. The tilting portion of the furnace is 48 feet 7 inches in length and the hearth is approximately 17 feet in width at the point where the lining of the bottom joins the walls. The roof, which is 13 inches thick, is arched to an 18-foot radius. The binding of both the tilting and stationary portions of the furnace is unusually heavy and its general arrangement is shown clearly in Fig. 13.

As shown in Fig. 13, the furnace is mounted on eight rollers arranged in pairs, four under each end. Each pair of rollers is carried in a cast steel truck frame which is free to swing on a pivot to a certain extent. The rollers themselves are 3½ feet in diameter. The power necessary to tilt the furnace is furnished by four 40-horsepower Westinghouse motors connected in pairs to two lead screws as shown in Fig. 14. The regenerators, which are of the customary type, are located under the charging floor. The air chambers are 22 feet long, 20 feet high and 14 feet in width; the gas chambers have the same height and length and a width of 10 feet. The valves are of the customary mush-

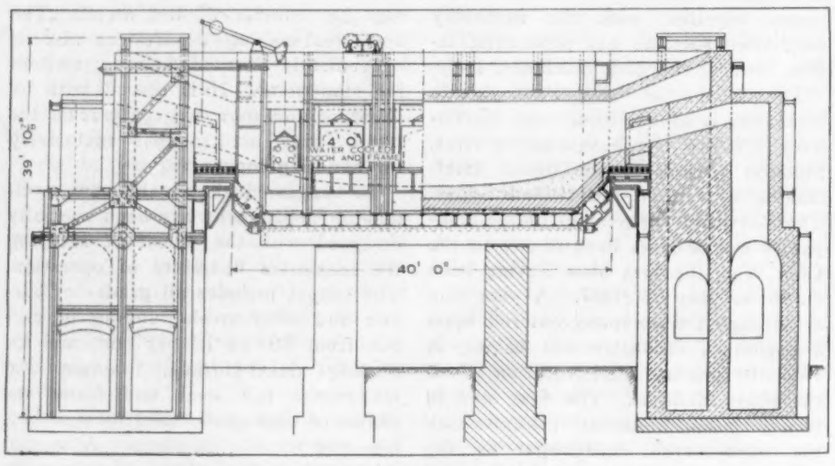


FIG. 3—ELEVATION AND VERTICAL SECTION OF STATIONARY OPEN-HEARTH FURNACE

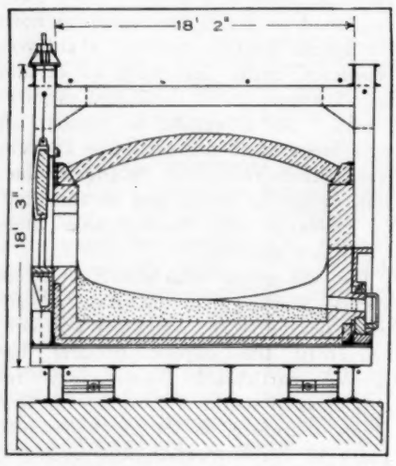


FIG. 4—CROSS SECTION OF STATIONARY OPEN-HEARTH FURNACE

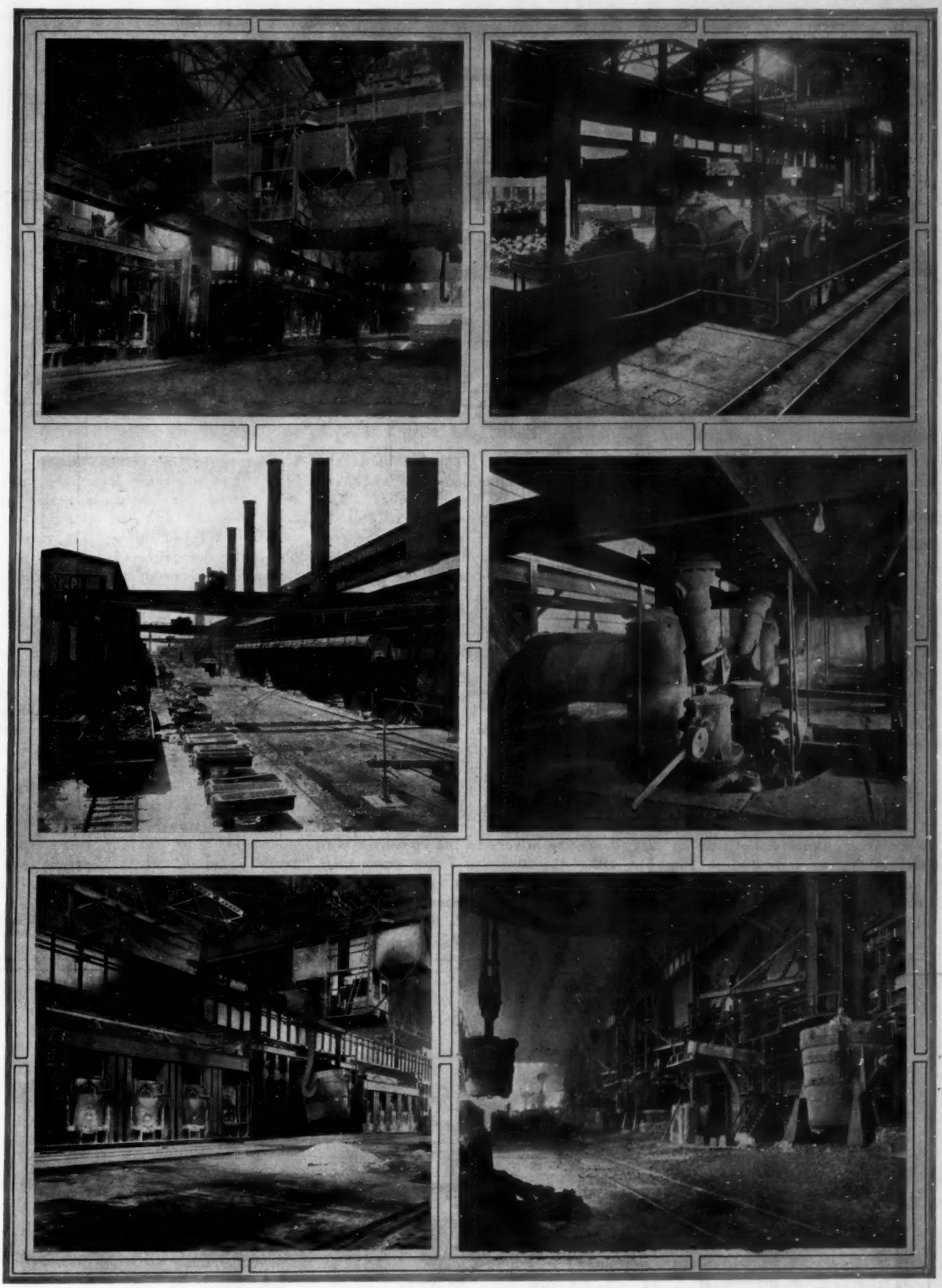


FIG. 5—CHARGING SIDE OF 90-TON STATIONARY FURNACES
FIG. 6—TWO 25-TON BESSEMER CONVERTORS IN POURING POSITION
FIG. 7—STOCK YARD BETWEEN OPEN-HEARTH BUILDING AND GAS PRODUCER HOUSE
FIG. 8—CHARGING FLOOR OF GAS PRODUCER HOUSE
FIG. 9—CHARGING SIDE OF 200-TON TILTING FURNACES
FIG. 10—TAPPING SIDE OF 90-TON STATIONARY FURNACES

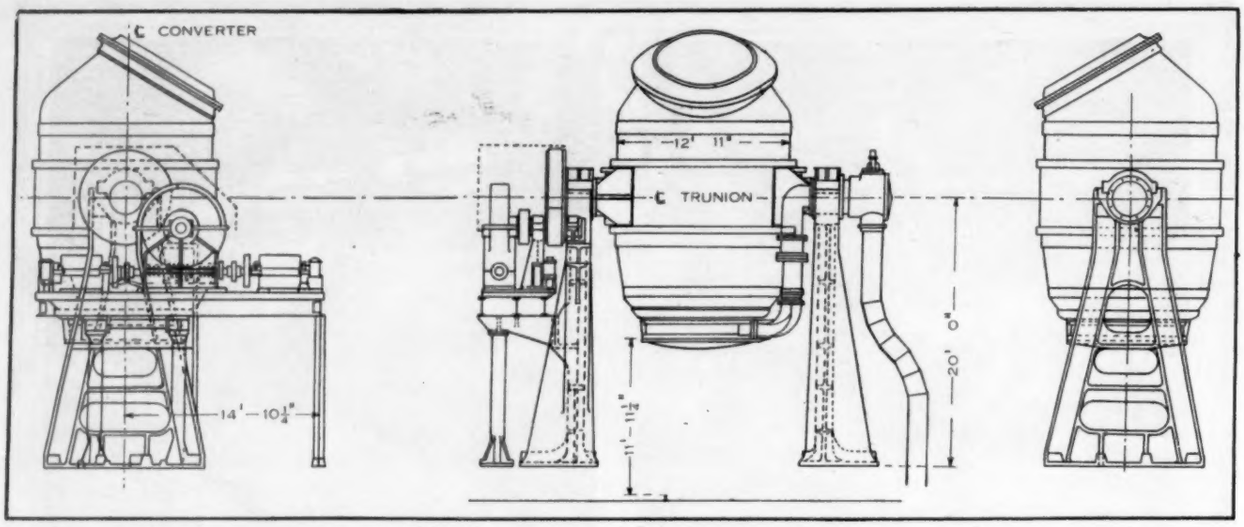


FIG. 11—GENERAL ARRANGEMENT OF 25-TON BESSEMER CONVERTOR

room type and the operating mechanism includes a chain tackle operated by a nut and lead screw connected to an electric motor. In other words, the valve operating gear is of the customary type except that the motor and lead screw have been substituted for the usual hydraulic cylinder. Scrap and other cold materials are charged into the tilting furnaces by a low type Wellman charging machine, which is electrically operated. A platform, which swings out of the way when the furnace is tilted, is built around the spout.

The general arrangement of the two Bessemer converters, which were furnished by the Pennsylvania Engineering Works, New Castle, Pa., is shown in Figs. 6 and 11. They are rated at 25 tons each and are mounted on cast steel pillars, as indicated in Fig. 11. The tilting mechanism consists of two motors connected to a worm gear which in turn drives a pair of herringbone spur gears. The trunnions are 20 feet from the floor line and have a spread of 18 feet 7 inches. The shell of the converter is 12 feet 11 inches in diameter, and when the vessel is in an upright position, the distance from the bottom to the track underneath is approximately 12 feet. The blast enters through an 18-inch pipe, the blowing equipment being located in a central power station some distance away.

The iron is brought from the blast furnaces in car ladles of 235 cubic feet capacity furnished by the Wm. B. Pollock Co., Youngstown, O. The metal is poured direct from the ladle into the mixers, the lips of which are 1 foot above the level of the stock yard. The metal may be transferred from the mixers to the converter with either the 60-ton or 75-ton crane mentioned above. The converters are spanned by an additional Shepard 5-ton crane equipped with a magnet for scrapping the vessels during the blow. The converter department also is provided with accurate scales of large capacity and the charges are carefully weighed through the various phases of the process to insure uniformity in the product. The metal is transferred from the converters to the open-hearth furnaces in 25-ton ladles of the bottom pour type.

The bottom and dry house for the converters is situated partially under the stock yard and partially in that portion of the gas producer building directly back of the receivers and converters. This gives a space of 40 x 252 feet, spanned by a 30-ton Alliance crane. The bottoms are dryed in four ovens fired by coke breeze. They are transferred between the converters and the dry house on a truck equipped with a hydraulic platform which lifts the bottom into place in the vessel.

The 800-ton and 400-ton mixers are

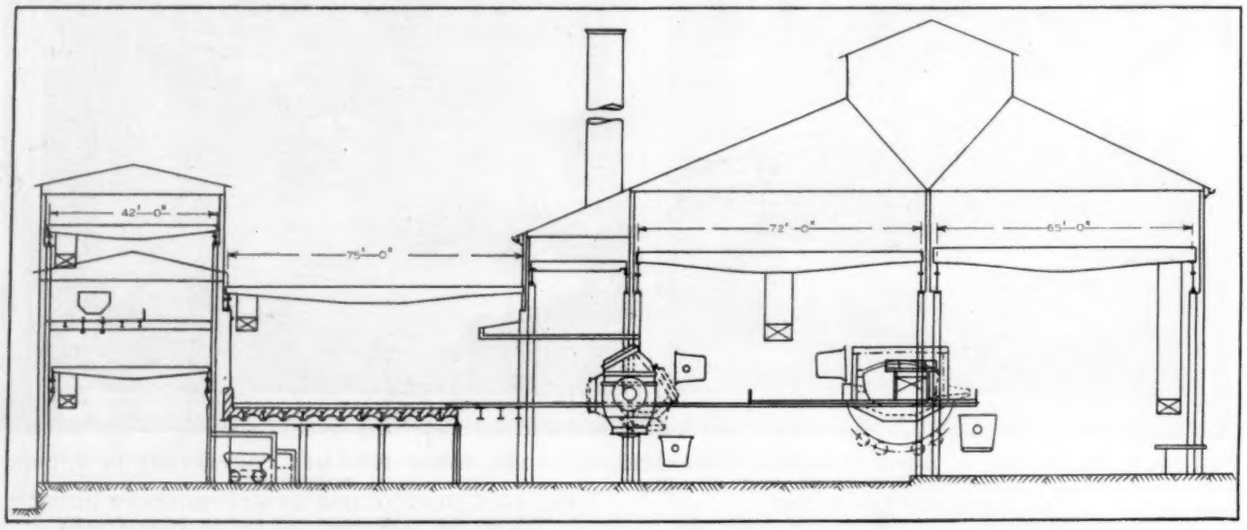


FIG. 12—CROSS SECTION THROUGH NEW OPEN-HEARTH AND BESSEMER DEPARTMENTS

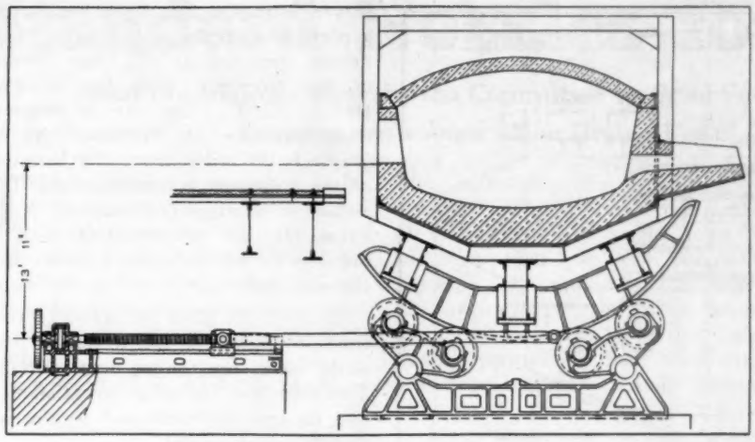


FIG. 13—CROSS-SECTION OF 200-TON TILTING FURNACE SHOWING TILTING SCREWS

similar in general design and are built along standard lines except that the tilting mechanism corresponds to that provided for the 200-ton open-hearth furnaces, described above. The 800-ton mixer has an overall length of 28½ feet, and the total width across the vessel from the receiving lip to the spout is 43 feet 9 inches. The overall height of the vessel is 21 feet 4 inches. The roof, which is 18 inches thick, is arched to a radius of 24 feet 7 inches. The bottom is 22½ inches thick, and is made on a 13½-foot radius. The tilting radius is 15 feet 7 inches.

The Stationary Furnaces

The six stationary open-hearth furnaces have a capacity of 27,000 tons per month on the pig and scrap process. This tonnage may be increased by the use of Bessemerized metal. The tilting furnaces will produce 20,000 tons per month each on the duplex process and 5,000 tons each on the jig and scrap process. In addition to the open-hearth output, Bessemer steel of any grade may be made in the converters.

The stationary furnaces, as shown in Fig. 3, are standard in construction and are designed to operate with minimum expense for repairs and labor. The door hoists are electrically operated and each furnace is provided with a circulating cooling system.

Each stationary furnace has an overall length of 82 feet and a width of 20 feet 8 inches. The hearth is 40 feet in length and approximately 15 feet in width. The pan rests on grill work of I-beams supported on brick piers. The regenerators are of the usual type placed under the charging floor behind the furnaces. They are ample in size and the gas and air uptakes and ports are liberally proportioned.

The open-hearth pouring bay is served by two 125-ton Morgan ladle cranes each provided with 25-ton auxiliary hoists and one 150-ton Alliance crane with two auxiliary hoists of 15 and 40-ton capacity, respectively. The latter crane is used for tapping the tilting furnaces and the 125-ton cranes are used for tapping the stationary furnaces. In the former case, the ladle containing the recarburizer metal is held by the 40-ton and poured with the 25-ton hoist. The slag from each furnace is handled in special Treadwell slag ladles which stand on brackets beside the steel ladles. When they are full they are transferred to dumping cars of the usual type. As mentioned above, the charging floors of the open-hearth furnaces are served by one 75-ton and two 60-ton cranes equipped with 25-ton secondary hoists. Two Wellman low type charging machines are provided for charging scrap, etc., into the stationary furnaces.

The stock yard, as mentioned above, is 75 feet wide and 924 feet in length. It is spanned by two 10-ton Morgan yard cranes equipped with lifting magnets and is also provided with a 40-ton Alliance crane which is used almost exclusively for pouring the molten iron from the ladles to the mixers. The stock yard is traversed by standard and narrow gage tracks and the charging boxes are filled with magnets. A part of the stock yard floor is heavy reinforced concrete supported on a frame work of I-beams and heavy steel columns.

Gas Producer Department

The general arrangement of the gas producer department is shown in Fig. 2. Six Hughes 10-foot mechanically poked gas producers furnished by the Wellman-Seaver-Morgan Co., Cleveland are provided for the tilting furnaces. They are arranged in a group by themselves north of the Bessemer bottom and dry house, as shown in Fig. 2. The gas for the six stationary furnaces is supplied by 15 Hughes producers similar to those connected with the tilting furnaces. Coal bins filled by overhead larry cars are situated over the producers and the fuel is handled with a minimum of effort. The ashes from the producers are discharged directly into standard gage cars which may be run in under the producer floor. The general features of this arrangement are shown in Fig. 8. The mixers may be heated either by tar or oil.

To supplement the new steel-mak-

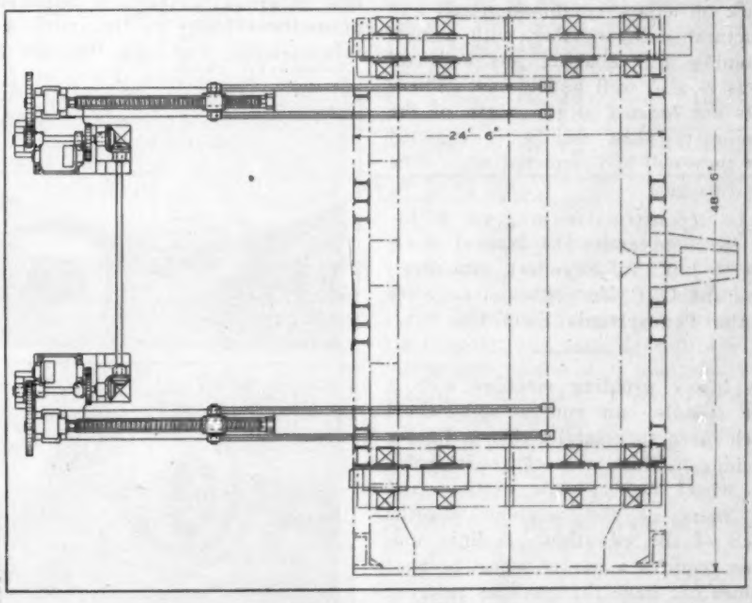


FIG. 14—PLAN OF 200-TON TILTING FURNACE, SHOWING TILTING MECHANISM

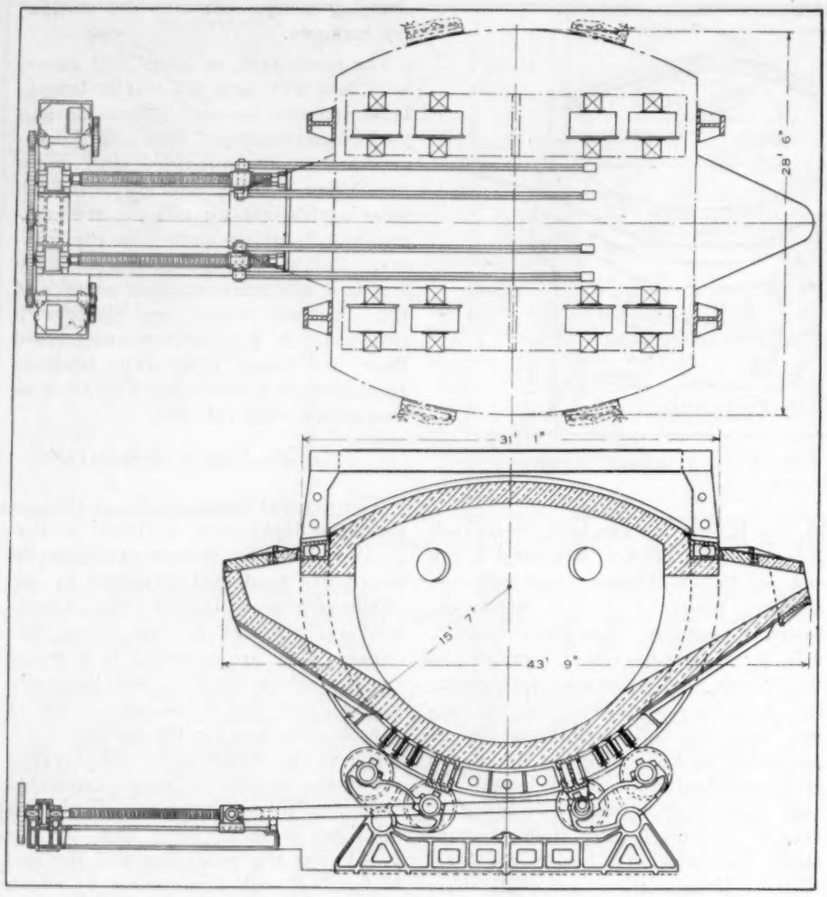


FIG. 15—PLAN AND CROSS SECTION OF 800-TON MIXER, SHOWING TILTING MECHANISM

ing department a large amount of additional new construction is now under way. Work has been started on a modern blast furnace of 500 tons daily capacity, which will be located opposite the Bessemer department. Work on a new combination rail and structural mill, together with a new blooming mill, soaking pits and roll shops is also well under way. These units are located at the north of the open-hearth plant and it is expected that they will be completed some time late this year.

The reconstruction program is being executed under the general direction of J. V. W. Reynders, vice president, and C. P. Turner, chief engineer of the Pennsylvania Steel Co.

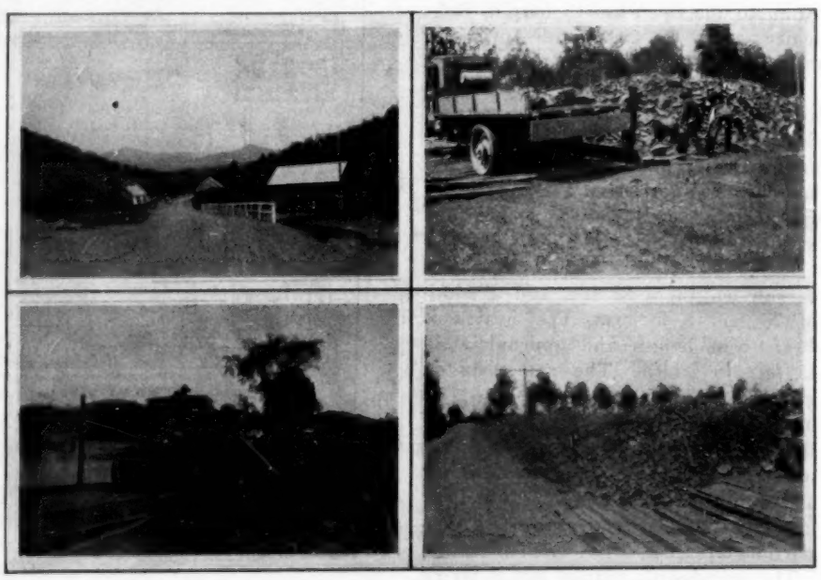
A heavy grinding machine with a stiff spindle can run a soft wheel much more successfully than a lighter machine. This is because it holds the wheel firmly while cutting, and the mass of the machine absorbs much of the vibration. A light machine requires a harder wheel because it does not have the qualities referred to. Don't forget to consider all these points in trying to find out exactly where the trouble lies.

Motor Trucks as Ore Carriers

Motor trucks recently have been used in the Adirondack mountains in New York for carrying iron ore, and this is probably the first application of motor vehicles to this purpose in this country. For some time the McIntyre Iron Co. has been conducting experiments on the reduction of titaniferous iron ore at the blast furnace of the Northern Iron Co. at Port Henry, N. Y. The ore is obtained from deposits at Tahawus, N. Y., which is 30 miles from the terminus of the Adirondack branch of the Delaware & Hudson railroad at North Creek, N. Y. About 10,000 tons of ore was mined and hauled overland to the railroad.

At first the plan of using several traction engines in the winter to draw sleds over the snow was adopted. This method proved unsatisfactory and haulage by horse and wagon was equally unsuccessful.

The company then entered into a contract with Geo. H. Pride, of New York City, to carry the ore with motor trucks. The trucks were obliged to move the material a distance of 22½ miles, the traction engines and sleds having succeeded in carrying it the first 7½ miles of the journey from the mine to the railroad. Mr. Pride used seven Pierce-Arrow 5-ton trucks, which were fitted with shallow wood bodies with removable sides and tail gates. At first, trailers were tried out, but were later abandoned owing to objections from the state against cutting up the highway. A force of laborers was employed both to load and unload the ore and the trucks were kept in operation day and night. The complete round trip of 45 miles between the stock pile and North Creek was accomplished in an average of 5¼ hours over a road marked by sharp curves and steep hills. Each truck made four round trips per 24 hours. In this manner the total 10,000 tons of ore were transferred to the railroad and loaded direct into freight cars.



MOTOR TRUCKS HAULING IRON ORE IN NEW YORK

Standard Nozzles for Foundries

Recommendations Made by the Committee on Steel Foundry Standards of American Foundrymen's Association Urging Use of Uniform Nozzles

THE committee appointed to investigate the possibilities of standardization of features of steel foundry practice has been engaged during the past year in investigating methods of standardizing nozzle brick in connection with ladle equipment.

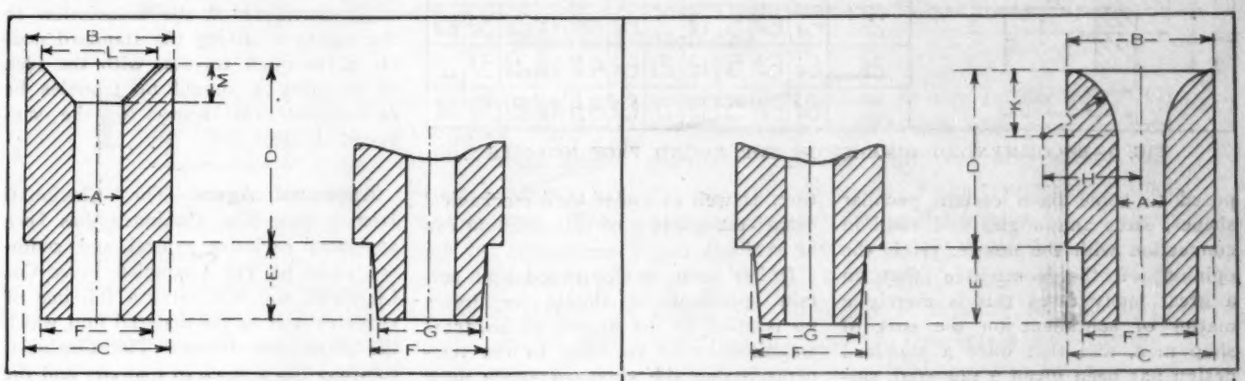
As a result of R. A. Bull's paper on some trouble encountered in pouring steel castings, which was read at the last convention of the American Foundrymen's Association, it was decided to go into the matter of standardization of nozzle-brick, with the idea of cutting down the very great number of different designs that the brick people now have to supply in small quantities to the numerous foundries, and in so doing make it possible for them to improve the quality of the brick because of large scale production.

Report of committee on steel foundry standards submitted by the chairman, Dudley Shoemaker, of the American Steel Foundries, Indiana Harbor, Ind., at the Chicago convention, Sept. 7-11.

The committee has made a very thorough investigation of the methods of manufacture of nozzle brick, and has found that the brick people will welcome any move in the way of standardization, as the nozzle business for the steel foundries forms only a small percentage of their total output. The troubles that various foundries have had in the past with nozzle brick, on account of the quality, are well known to all. The only remedy for these troubles seems to be the standardization of design for all of the steel foundries of this country, so that the larger user and the small alike can be assured of a uniform product properly selected with regard to its constituent materials, properly tempered before being put in the kiln and properly treated in the kiln.

The committee has found that there is absolutely no reason why a uniform product cannot be obtained with nozzles than with the best grades of clay brick. The trouble has not been that of the unwillingness of the brick makers to supply satisfactory material, but rather on account of the fact that quick delivery demands have been made on small quantities and repeated changes in design have had to be met by the brick makers, with the result that the manufacturers becoming discouraged over the possibility of working up a profitable business among the steel foundries, treated the matter rather as a side issue, depended on their standard designs of brick for their profit, and took care of the requirements of the steel foundries with regard to nozzles in order to keep in their good graces.

That the standardization of this feature of steel foundry practice will be of great benefit to all of the steel foundries, as well as to the brick makers, cannot be denied, therefore the committee on this subject respectfully suggests that the standard nozzle design that is submitted herewith as being satisfactory for all steel foundry



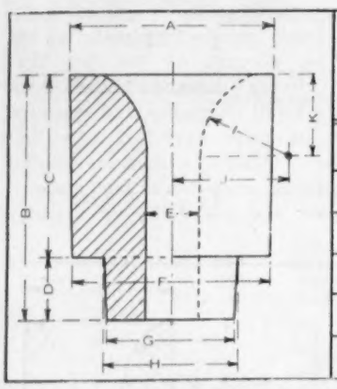
Name of Foundry.	Dimensions in Inches A	B	C	D	E	F	G	L	M
Wellman-Seaver-Mor..	2	5½	5	5	1	4	4	4½	7/16
Union Steel	2½	5¼	4 11/16	4½	1½	3 7/16	3 5/16	4½	11/16
National Malleable...	2 1/16	6	5 11/16	5 7/16	1 3/16	4 11/16	3 3/16	5¼	1 5/16
National Malleable...	...	5 1/16	4 7/16	3 5/16	1½	3	2½	5 1/16	1 5/16
National Malleable...	...	5 1/16	5	4 1/16	1½	3 3/16	3 1/16	5¼	1½
American Bridge.....	3	5 1/16	5 1/16	5 3/16	1½	4	4	4½	1
American Bridge.....	2	5½	5 1/16	6 1/16	1½	4	3	4½	1 5/16
Columbia Steel.....	2	5 3/16	5 1/16	5	1 3/16	4 3/16	4 1/16	4½	7/16
Hubbard Steel.....	2½	6	5 5/16	6 3/16	3	4½	4 1/16	4¾	3/16
Seaboard Steel.....	2 3/16	5 1/16	5 1/16	4 5/16	2	3 1/16	3 1/16	3 1/16	3/16
Wheeling Mold.....	3	5 7/16	5 7/16	7	2 3/16	4 1/16	4 1/16	5 1/16	1 3/16
Baldt Steel.....	...	6	6	4	2	5	5	4	7/16
Baldt Steel.....	...	6	6	4 5/16	2	4 3/16	4 1/16	3 3/16	7/16
Allegheny Steel.....	2	6	6	7	4	4 1/16	4 1/16	4 3/16	1 5/16
Detroit Steel.....	1 3/16	5 3/16	5 3/16	6 1/16	2	3 1/16	3 1/16	4 1/16	1 5/16
National Foundry....	2	5 1/16	5 1/16	4 1/16	3	3 1/16	3 1/16	4 1/16	1
Ohio Steel	1 1/16	5 3/16	5 3/16	7	1 7/16	4 1/16	4 1/16	4 5/16	...
Ohio Steel	3	5 3/16	5 3/16	7	1 7/16	4 1/16	4 1/16	5	...
Penn Steel Castings.	2	4 11/16	4 11/16	3 3/16	2 3/16	3 3/16	3 3/16	2 3/16	3/16
Penn Steel Castings.	2 1/16	6 3/16	6 3/16	4 3/16	2	4 3/16	4 3/16	3 1/16	2 5/16
Penn Steel.....	2 1/16	7	7	4	1 3/16	4 3/16	4 3/16	6	11/16
St. Louis Steel.....	1 1/16	5 1/16	5 1/16	4 1/16	1 1/16	4 1/16	2 7/16	4 1/16	1 1/16
Strong Steel	1 1/16	5 1/16	5 1/16	4 1/16	2 1/16	3 1/16	3	4 1/16	1 1/16
American Steel Fdys.	2	5 7/16	4 11/16	7	1 3/16	3 3/16	3 3/16	4 3/16	1 1/16
Bettendorf Co.	1 3/16	5 3/16	5 3/16	6 3/16	2 1/16	3 1/16	3 1/16	4 3/16	1 1/16
Average	2 1/16	5 5/16	5 1/16	5 1/16	2	4	3 13/16	4 7/16	1 3/16

Name of Foundry.	Dimensions in Inches A	B	C	D	E	F	G	H	J	K
Birdsboro Steel..	2½	5 7/16	5 3/16	4 3/16	2 1/16	4 1/16	4 1/16	2 1/16	1 1/16	1 1/16
Birdsboro Steel..	3	5 7/16	5 3/16	4 3/16	2 1/16	4 1/16	4 1/16	2 3/16	1 1/16	1 1/16
Bucyrus Co.	2	7	6 1/16	4	1 7/16	4 7/16	4	3	2	2
Cleveland Steel..	2	6 1/16	5 3/16	5 1/16	2	4 7/16	4 1/16	3 1/16	2 7/16	2 3/16
Chester Steel....	2	5 7/16	4 7/16	4 3/16	1 7/16	4	3 1/16	2 1/16	1 1/16	1 1/16
General Electric.	2	5 1/16	4 3/16	4	1 1/16	3 3/16	3 1/16	3 7/16	2 1/16	2 1/16
General Electric.	2	5 1/16	5	4	1 1/16	3 3/16	3 1/16	3 1/16	2 1/16	2 1/16
Monarch Steel...	1 1/16	5 1/16	4 7/16	5	1 1/16	3 1/16	3 1/16	3	2 1/16	2 1/16
A. J. Haw & Sons.	2	4 1/16	4 1/16	4	1 1/16	3 1/16	2 3/16	1 7/16	1 1/16	1 1/16
Duquesne Steel..	1 1/16	5	5	4	2 1/16	3 1/16	3 1/16	3 1/16	3 1/16	3 1/16
Jones & Laughlin.	1 1/16	5 1/16	5 3/16	8 1/16	1 1/16	4 1/16	4 1/16	2 3/16	2	2 1/16
Jones & Laughlin.	2 1/16	5 3/16	5 3/16	8 1/16	1 1/16	4 1/16	4 1/16	2 1/16	2	2 1/16
Lawrence Steel..	1 3/16	4 3/16	4 3/16	4	1 1/16	3 1/16	3	3 1/16	2 1/16	2 1/16
McConw'y&Torl'y.	2	4 7/16	4 7/16	7	1 1/16	3 7/16	2 11/16	3 7/16	2	1 7/16
Mesta Machine..	2 1/16	5 1/16	5 1/16	5 1/16	1 3/16	4 7/16	4 1/16	2	3/16	3/16
Mesta Machine..	3 1/16	6 1/16	6 1/16	5 1/16	1 3/16	4 7/16	4 1/16	2 1/16	3/16	3/16
Ft. Pitt Foundry	3	5 1/16	5 1/16	5	1 7/16	4 1/16	4 1/16	2 1/16	1	1 7/16
Com'wealth Steel	2 1/16	5 3/16	5 3/16	6 1/16	1 1/16	3 1/16	3 1/16	2 1/16	1	1 1/16
Scullin-Gallagher.	2	6	6	5 1/16	1 3/16	3 3/16	3	3 1/16	2 1/16	2 1/16
National Steel...	2	4 3/16	4 3/16	4 1/16	1 1/16	3 7/16	2 1/16	3 1/16	2 1/16	2 1/16
Buckeye Steel...	1 1/16	6 7/16	6 7/16	5 3/16	1 3/16	3 7/16	3 7/16	3 1/16	2 3/16	2 3/16
Falk Co.....	2 1/16	5 1/16	5 1/16	3 3/16	1 7/16	4	4	...	...	...
Falk Co.....	2	4 1/16	4 1/16	3 3/16	1 7/16	3 3/16	3	...	...	...
Amer. St'l Fdys.	2	6 1/16	6 1/16	4 3/16	2	4 3/16	4 1/16	3 1/16	2 1/16	2 1/16
Pittsburgh Steel.	3	5 3/16	5 3/16	4 1/16	1 7/16	3 3/16	3 3/16	3	1 1/16	1 1/16
Prime Steel.....	1 3/16	6	6	4	1 3/16	3 3/16	3	3	1 3/16	1 3/16
Otis Steel.....	2 1/16	6	5	4 3/16	2	4 1/16	4 1/16	...	...	...
Average.	2 1/16	5 1/16	5 1/16	5	1 3/16	3 13/16	3 11/16	2 11/16	1 11/16	1 11/16

FIG. 1—DIMENSIONS OF NOZZLES IN USE IN VARIOUS STEEL FOUNDRIES

practice be given at least a fair trial by all.

The committee realizes that it is an utter impossibility to please everybody in a matter of this kind. Certain results in certain foundries are supposed to come from certain peculiar shapes, sizes and angles and radii in connection with the nozzle. It is the opinion of the committee that in a great many cases this is merely a matter of sentiment on the part of shop men, and that once a standard design has been given a fair trial, satisfactory results will be obtained, and it will be decided to continue the use of this design of nozzle.



DIAMETER OF NOZZLE	A	B	C	D	E	F	G	H	I	J	K
INCHES	INCHES										
1½	6¼	6¾	5	1¾	1½	6¼	3⅝	3¾	2½	3¼	2¼
1¾	6¼	6¾	5	1¾	1¾	6¼	3⅝	3¾	2⅝	3¼	2⅛
2	6¼	6¾	5	1¾	2	6¼	4½	4⅝	2½	3½	2¼
2½	6¼	6¾	5	1¾	2½	6¼	4½	4⅝	2¼	3½	2
3	6¼	6¾	5	1¾	3	6¼	4½	4⅝	2	3½	1¾

FIG. 2—RECOMMENDED DIMENSIONS FOR ROUND FACE NOZZLES

In compiling the standard your committee got in touch with 42 of the principal steel foundries of this country. The answers are shown in Fig. 1. All of the big manufacturers of steel castings are represented, and while the nozzle decided on by the committee does not represent the exact average of all of the dimensions received, there have been few radical departures from the average, the aim being to decide on a design that would be adopted most easily by all. There appears to be an equal division of opinion in regard to the relative desirability of the round face and straight face nozzle. This being the case, the committee recommends that two general designs of nozzle, shown in Figs. 2 and 3, be decided on as standard, one having the round face and the other the straight face.

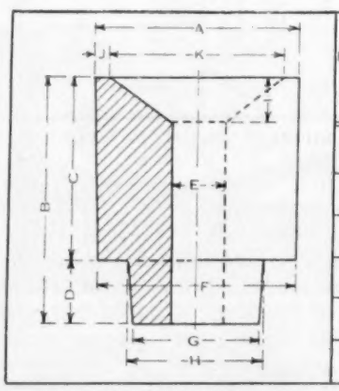
The committee recommends that five sizes of nozzles be decided on for each of the general designs, the sizes to be as follows: 1½, 1¾, 2, 2½ and 3-inch diameter hole.

The outside diameter of the smaller size nozzles might appear to some to be a little large, but it was decided that it would be best to keep this dimension constant for all sizes of nozzles, and this decision was reached because we believe that it would be good policy to make the dimension of the brick generous, on account of the importance of its work. When it is realized that the successful casting of 20 tons of metal or over depends upon the ability of a small clay brick to stand up under a severe temperature, as well as under hard mechanical usage, the wisdom of this decision can be realized.

It has been recommended that certain specifications should be drawn up relative to the degree of hardness constituency of the clay to the temperature that the standard nozzle must withstand in order to meet requirements of steel foundries. The committee, upon investigation, finds that it is impossible to tell what degree of hardness has been obtained in baking, other than by testing with a blunt instrument. The constituency of the clay cannot be determined by analysis, and each manufacturer must decide for himself what kind of clay will be satisfactory for his purpose.

It is the opinion of the committee that brick makers distinctly should understand that this standardization is of particular interest to the steel foundrymen only. They should be made to realize that because a particular product gives satisfaction in rolling mill ingot practice, that fact is no criterion of its usefulness in the steel foundry, where the most severe service is encountered.

Blue prints of the standard designs of straight and round face nozzles will be forwarded to all brick makers who make nozzles, with the statement that they represent the standard nozzle as decided upon by the American Foundrymen's Association committee, and with the request that they prepare molds in anticipation of orders for nozzles of these designs. It is obvious that the success of this scheme depends upon the co-operation of all of the members of the association, and it is hoped by the committee that its efforts will be appreciated by the other members of the association to the extent of giving the standard nozzle a thorough try-out, with the idea of adopting it should no troubles be encountered with respect to the suggested design.

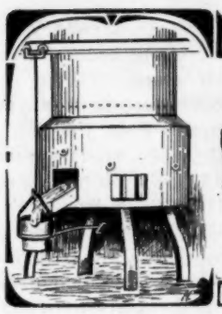


DIAMETER OF NOZZLE	A	B	C	D	E	F	G	H	I	J	K
INCHES	INCHES										
1½	6¼	6¾	5	1¾	1½	6¼	3⅝	3¾	1¼	⅜	5
1¾	6¼	6¾	5	1¾	1¾	6¼	3⅝	3¾	1 1/16	⅜	5
2	6¼	6¾	5	1¾	2	6¼	4½	4⅝	1¼	⅜	5
2½	6¼	6¾	5	1¾	2½	6¼	4½	4⅝	1 1/16	⅜	5
3	6¼	6¾	5	1¾	3	6¼	4½	4⅝	15/16	⅜	5

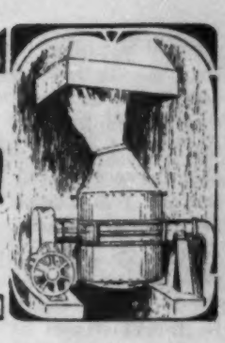
FIG. 3—RECOMMENDED DIMENSIONS FOR STRAIGHT FACE NOZZLES

Appointed Agent.—The Cincinnati Iron & Steel Co., Cincinnati, has been appointed exclusive central and southern agent of The Champion Rivet Co., Cleveland, and will carry a full line of rivets as well as the material into which the rivets are driven. The Cincinnati company has a stock in that city and the Champion has stocks in Cleveland and East Chicago.

On Reduced Time.—The General Electric Co. has decided to run its plants at Lynn, Mass., part time. This alternative was adopted in preference to closing the plant entirely for a period. The dull times and the war are assigned as causes for the falling off in business, which necessitates the reduced operations. The new schedule provides that the meter department will close each week from Friday until Monday, and the instrument department from Thursday until Monday. The departments which for some time previous had been running on a short schedule, will continue as heretofore.



GREAT FOUNDRY CONVENTION AT CHICAGO



The Record of a Splendid Achievement

Report of Annual Meetings of Allied Foundry Organizations—Over Sixty Papers Read and Discussed

PROMINENT among the developments at the joint convention of the allied foundrymen's organizations, held at Chicago Sept. 7 to 11, was an important change in policy by the American Foundrymen's Association. This body decided to greatly expand its committee work and a number of new standing committees were appointed which will investigate technical problems and submit reports at the annual conventions, recommending definite courses of action. The new policy was the outgrowth of a remarkable report submitted by the committee on steel foundry standards, which, as the result of a thorough investigation during the year, recommended a set of ladle nozzle specifications. This report aroused much enthusiasm and was adopted unanimously. Action was taken which will lead to the amalgamation of the Associated Foundry Foremen with the American Foundrymen's Association and the executive committee of the latter organization was requested to complete the work.

In number as well as in volume and quality of contents, the papers read at this convention greatly eclipsed those of any former year. Of particular significance was the great interest manifested at the joint cost and safety congresses, indicating that foundrymen more than ever before are alive to the importance of these two subjects. In addition, both the A. F. A. and A. I. M. contributed a large mass of valuable, new information relating to metallurgy and shop practice. In connection with the convention, there was held at the International Amphitheater, the usual exhibition of foundry and shop equipment. This was completely described in THE IRON TRADE REVIEW last week. The attendance at the exposition and the technical sessions was gratifying. More than the usual proportion of presidents, managers and other executives occupying important positions was in evidence and consequently the purchasing power of the visitors was above the average. The attendance at the various professional sessions was completely satisfactory and at the cost congress, Wednesday morning, it was estimated that at least 500 persons listened to the proceedings.

THE convention was called to order Tuesday morning at the Hotel La Salle with the three allied organizations sitting in joint session. H. O. Lange, chairman of the general committee of Chicago foundrymen, extended a cordial welcome to the visiting delegates. His address was responded to by A. E. Howell, president, and R. A. Bull, senior vice president, American Foundrymen's Association; G. H. Clamer, president, American Institute of Metals, and S. V. Blair, president, Associated Foundry Foremen. President Howell introduced the new secretary-treasurer of the American Foundrymen's Association, A. O. Backert, who made a brief address and read a telegram from his predecessor, Dr. Richard Moldenke. Dr. Moldenke regretted his inability to attend the convention and expressed his hope that the various technical sessions would prove highly successful.

Safety and Sanitation

The convention then immediately proceeded to the technical end of the program. The first session, which was held jointly by the three organizations, was devoted to the discussion of safety and sanitation work in foundries. One of the principal speakers was M. W. Alexander, General Electric Co., West Lynn, Mass., whose remarks aroused a large amount of enthusiasm. Mr. Alexander came to the convention equipped with samples of paraphernalia which he has developed during the past year for safeguarding workmen from accidents. They included goggles, shoes and leggings particularly adapted to use in the foundry. The goggles which the speaker exhibited were provided with large glasses, in order that the workman might be assured a wide range of vision, and with flexible steel frames which could be adjusted as desired. The shoe which he displayed was of the Congress type and he called particular attention to the fact that the leather was of the chrome tanned variety. This, he said, was preferable to the bark tanned leather, which, while cheaper, is more liable to develop cracks and stretch in service. The speaker also exhibited a new style of legging made of canvas and fastened to the leg by means of ordinary bicycle clips. This type of legging permits of immediate

removal if molten iron should enter it. Mr. Alexander suggested that it would be to the interest of every foundry employer to make a study of the most frequent and dangerous accidents encountered in foundries, to the end that deaths and injuries may be prevented wherever possible. The commonest cause of accidents, he said, is lack of care on the part of the workmen and it therefore should be the chief aim of the employer to see that the workmen exercise care. Personal caution, he said, is the greatest safeguard. Mr. Alexander recommended that the aisles in foundries be kept clear of all obstructions in order that workmen, and particularly molders carrying iron, may not stumble and thus endanger themselves and others. For indicating danger spots he recommended the use of small signs which should bear an arrow pointing in the direction from which danger may be expected. The speaker also recommended that large foundries should maintain a dispensary and employ a physician. In addition he said the large plants should train men in the art of giving first aid to the injured. Even the smaller foundries, he said, can afford to have on hand a man who is versed in this art. Mr. Alexander exhibited a glass jar of unusually interesting construction containing a complete set of ointments, medicines and the paraphernalia necessary in case of emergency.

A Safety Organization

An interesting paper, which was submitted by A. W. Gregg and G. F. Kent, was devoted to a description of the accident prevention work of the Bucyrus Co., South Milwaukee, Wis.

This paper showed that the Bucyrus Co. reduced its accident ratio from 13.35 per cent of the number of employes in 1910 to 4.76 per cent in 1914. This shows a reduction of serious accidents of more than 65 per cent. During 1913, the Bucyrus Co. had a total of 1,224 accidents in its South Milwaukee plant, and the records show that only six of them could have been prevented by a mechanical guard. In order more fully to follow up the work that has already been done, the Bucyrus Co. has provided a new safety organization, which was described in this paper. It consists of a central committee, a works committee and several shop committees.

The reading of this paper was accompanied by lantern slides showing safety devices, danger signs, etc.

"Progress in the Safety Movement and the Latest Aids to Good Safety Work," was the title of a paper submitted by Arthur T. Morey.

"The public," said Mr. Morey, "still looks at factories, railroads and powder plants and considers abnormal conditions as the causes of accidents, instead of realizing that they are only the results of common habits of carelessness. The big accidents, like the Titanic disaster, are not sporadic happenings under unusual circumstances, but come largely from racial habits of careless thought, and the man who causes a great catastrophe is anathematized for manifesting a racial characteristic. Through thorough organization and the enlistment of the cooperation of its employes," said the author, "the accident record of the Commonwealth Steel Co. shows a reduction in compensation loss of 73 per cent." This paper described the safety organization of the Commonwealth company and also referred to the work of the National Council for Industrial Safety.

A paper on "Safety First", by F. W. Reidenbach, dealt with the causes of accidents and suggested preventive measures and remedies. After making a thorough examination of a large number of casualties, the author concluded that the most vital causes of industrial injuries are lack of proper education and the use of intoxicating liquors. He, therefore, suggested that steps be taken so that all men employed in shops and foundries will have at least a common school education and that total abstinence be insisted upon.

Grinding Wheel Accidents

A large number of valuable suggestions on how to avoid grinding wheel accidents were embodied in a paper by R. G. Williams, Norton Co., Worcester, Mass.

Mr. Williams recommended that the speed of the wheels should be rigidly controlled and under no circumstances should the limit set by the manufacturer be exceeded. Washers of some compressible material should be used between the wheel and the flanges. All flanges, either straight or safety shape, should be relieved. Wherever operating conditions will permit a well designed, substantial protection hood should be used. In such situations a tapered wheel and flanges of a corresponding taper are not necessary. Where protection hoods cannot be used, tapered wheels with safety flanges are the next best thing. Exhaustive tests, however, indicate that safety flanges alone do not afford complete protection.

Fred Moerl, Chicago, submitted a paper entitled "Sanitation and Safety First in the Brass Foundry". It was published in full in THE IRON TRADE REVIEW, Sept. 10.

Cost Congress

The occasion for a second joint session, participated in by the three organizations, was the cost congress, held Wednesday morning. At this session a great deal of light was shed on the careless methods employed by a great many foundrymen in computing their costs.

One of the most interesting papers was that on "Foundry Cost Keeping", by F. V. Stephenson, cost expert of the National Association of Stove Manufacturers, Hoosick Falls, N. Y. The speaker emphasized the pressing need for the adoption of a standard method of cost keeping in foundries, to the end that "some concerns would cease to sell $1 worth of goods for 90 cents". He admitted the impossibility of developing a system of cost keeping which should be above criticism and said that in a great many cases, one cost theory is as good as another. Concerted action, he said, should be taken by foundrymen to determine upon a satisfactory method of keeping costs and this should be adopted as standard in order that all foundries may compute their costs in the same general manner. Mr. Stephenson recounted the efforts he has made during the past year to further the adoption of similar cost theories by manufacturers of stoves and believed that before the end of the present fiscal year practically all of the large stove manufacturers in the country will have fallen in line.

In a paper entitled "Estimating the Selling Price of Castings", A. O. Backert, secretary of the American Foundrymen's Association, described the results of an investigation he conducted in an effort to ascertain the methods pursued by foundrymen in estimating the selling price of castings. This paper was published in abstract in the Sept. 10 issue of THE IRON TRADE REVIEW.

Revision of A. F. A. Cost System

An especially interesting paper was contributed jointly at this session by Harrington Emerson and J. K. Mason, two of the country's foremost cost experts. This paper constituted a revision of the standard foundry cost system of the American Foundrymen's Association. The text was devoted mainly to an explanation of the cost keeping chart which accompanied the paper. This cost system is based on the following general principles: There are three basic causes for expense—material, labor and capital charges. Foundry cost may be divided into four divisions, metal costs, conversion cost, floor cost and cleaning costs. Cost analysis is simply the separation of the three basic expenses into charges against each item of the four divisions mentioned above. The reporting of gross foundry cost is merely the re-assembly of the analysis, to tell the story of operation

step-by-step as the details mass into a cumulative total.

Frederic A. Parkhurst, Aluminum Castings Co., Detroit, contributed a 133-page discussion entitled "Scientific Management in the Foundry". This was published in THE IRON TRADE REVIEW, Sept. 10.

In discussing this paper, F. H. Schutz, of the H. Mueller Mfg. Co., Decatur, Ill., described the bonus system which has been in operation at this company's plant for about 10 years. This system is of the "flat" variety, which, the speaker contended, to be preferred to the differential bonus system. The latter system, he said, usually provides for the payment of a higher price per casting to the molder than that on which the company bases its selling price. In consequence, the differential system, he said, works almost entirely to the interest of the workmen. In the Mueller plant, Mr. Schutz said, the management decides what number of molds on a certain job are to constitute a day's work, and for each mold in addition to this number, the molder receives compensation based on the corresponding pro-rata of the day's pay. The company, he said, discourages any tendencies on the part of the workmen to consider this bonus as "spending money", by paying it out only every three months. By this method each molder receives four times a year a check which generally ranges between $20 and $150. Some of the molders employed by the company use this money to buy homes.

Locating in a New Territory

L. L. Anthes presented a paper entitled "Industrial Pioneering, or the Location of a Foundry in a New Territory". The many problems that must be considered by a manufacturer before locating a plant in a new territory, and difficulties which will arise in the employment of men, were brought out by the author. The question of selecting the site with its possible market, bonus propositions, railroad facilities and contiguous markets was given careful consideration. The plant referred to by the author is located in Canada where extremes of temperature prevail in summer and winter. This necessitates the construction of a plant that will protect the employes regardless of climatic conditions and the cost of building is a factor that should receive more than ordinary attention. Other factors that must not be overlooked are the labor market, basis of wage payment, relations with other manufacturers, cost of living, etc. The author states that the pioneer in manufacturing, like any other pioneer, must have youth, optimism and determination, as well as a certain amount of cash in hand.

"Elimination of Waste Motion in Bench Molding" was the title of a paper presented by R. E. Kennedy and J. C. Pendleton, of the foundry department of the University of Illinois.

The authors pointed out that every shop has almost an unlimited number of opportunities for reducing time and cost with only a very small expenditure of money. The necessary changes can be brought about by following out the suggested improvements shown by the careful time and motion studies. In order to show in a concrete way what can be done along this line, the authors made a study of bench molding and found that there were three principal causes

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for delay. In many cases the tools were not in the most convenient positions for handling; in others the workman did not have the necessary tools nor were those he did have in good shape; in still other cases the molder did too much unnecessary work. These three causes for decreased production were analyzed in considerable detail and an improved design for a molder's bench was presented.

"Training for Foundry Leaders at Wentworth Institute" was the title of a paper submitted by E. A. Johnson.

This paper was devoted to a new development in the work of Wentworth Institute, which is directed toward the training of leaders to supply the demand for intelligent, practical executives in the foundry field. The leader in a modern foundry, said the author, has a great variety of responsibilities. His position is a complex one. It includes getting business, managing men, the upkeep of complicated mechanical equipment, the development of better methods of foundry practice, the improvement of quality of product and the lowering of costs. The Wentworth course in foundry practice is planned to cover these points. It is designed to train young men exclusively for the advanced positions in the foundry industry. The instruction includes practical shop experience, text book study, drawing room work, laboratory work, etc., the details of the course being thoroughly covered in the paper.

Thomas D. West, of Cleveland, submitted a paper entitled "Evils Embodied in Specialization".

Miscellaneous Papers

Prominent among the papers presented at the Tuesday afternoon session were two on motor drive and two others on grinding wheels, by H. F. Stratton, S. H. Libby, C. F. Dietz and Clarence Hawke, respectively. Mr. Stratton's paper deals with the economics of electric motor drive and is published in full elsewhere in this issue.

Mr. Libby's paper on the "Selection of Electric Motors and Controllers for the Foundry" was published in abstract in THE IRON TRADE REVIEW, Sept. 10.

The paper points out that the problem of proper motors and controllers for foundry use must be studied with reference to the selection of alternating or direct current; the type of motor; the type of control and the size of motors. For crane motors direct current is preferable and 230 volts is a desirable pressure if cost of insulation and copper are considered. The speed control of crane motors is important and while a rheostat control is suitable for handling flasks or pig iron, it is not satisfactory in lifting copes, drawing patterns or pouring. Foundry crane motors should handle considerable variations in load with but little change in speed. For general foundry purposes a compound wound motor with a 10 to 15 per cent series field is satisfactory.

Grinding Wheels

The papers on gringing wheels aroused considerable discussion. Mr. Dietz's paper entitled the "Selection of Grinding Wheels for the Foundry" is abstracted as follows:

The development of the modern grinding wheel has been simultaneous with the development of the modern foundry. It would be quite impossible to conceive of a foundry with the melt running into hundreds of tons daily, removing the fins and spurs of its castings by means of a chisel and file. A grinding wheel is both a chisel and file in one instrument, a massive aggregation of little cutting tools bonded together in such a manner that their high speed of rotation provides an opportunity for the rapid and economical removal of large quanti-

ties of metal. To get the best results out of grinding wheels great care must be used in selecting a wheel of the proper hardness and with a suitable grain size for the work at hand. The life and productivity of a wheel made of a given abrasive material is directly measured both by the grain size and the strength with which the grains are held together.

This paper includes many suggestions for selecting the proper type of abrasive and the correct grain size and kind of binding for different classes of work. The bond to be used for any given operation depends upon several factors, including the wheel and work speeds, the condition of the grinding machine, the area of the casting in contact with the wheel, the ability of the operator, the character of material being ground and the finish desired. Similar considerations govern the selection of the proper grain size.

A diagram showing the relative efficiency of abrasives of different kinds constitutes one of the important features of this paper. It shows that carbide of silicon is most efficient on materials low in tensile strength, such as cast iron, phosphor-bronze, brass, granite, etc., while alundum has its greatest efficiency on steel, malleable iron, etc.

Abrasives

Mr. Hawke's paper covers the general subject of abrasives, commencing with a definition of abrasion. Such abrasives as emery, corundum, garnet, etc., are discussed, and the manufacture of grinding wheels with natural abrasives is described. In a similar manner the paper takes up artificial abrasives, including silicon-carbide, aluminous abrasives, etc. The paper explains why garnet is particularly valuable for grinding wood. Its scale of hardness lies between 7 and 8 and the crystals are seldom solid. Instead they are fractured along irregular planes which permits the grains to be easily broken down so that sharp cutting edges are always in contact with the fibrous material being ground.

In the discussion of the papers on abrasion, Dudley Shoemaker, of the American Steel Foundries, Indiana Harbor, Ind., asked if there is any known method by which the user of grinding wheels can test them to determine their grade and whether they are hard or soft enough for particular classes of work. Mr. Hawke replied that there is no method of testing wheels except with a chisel and this process requires unusual skill. It was pointed out, however, that the manufacturers of wheels take great care in grading them and under ordinary circumstances the grades can be relied upon. Mr. Hawke also said that an increase of 150 per cent in wheel life is possible through the elimination of unnecessary dressing and proper use of the wheels.

Oxygen in Pig Iron

A paper was presented by J. E. Johnson Jr., pointing out the beneficial effect of oxygen in charcoal iron. The oxygen is introduced into the iron by blowing it in a Bessemer converter. Half a charge is first placed in the converter and blown as cold as possible until the silicon is practically eliminated, the carbon remaining unchanged. As the silicon leaves, oxygen enters and remains in the iron at the comparatively low temperature of the blow. As soon as all the silicon is removed, the remaining half of the charge, which contains twice as much silicon as is desired in the final product, is mixed with the iron in the converter. The details of this process were covered in a paper presented by Mr. Johnson before the American Institute of Mining Engineers last spring. It is claimed that the oxygenized iron has superior qualities and a number of test figures were presented showing tensile strengths of 33,800 to 34,800 pounds per square inch and a transverse strength of 4,505 to 4,875 pounds, using a standard American Society of Testing Materials' 1¼-inch round bar. The bars which were tested analyzed 0.85 per cent combined carbon; 2.65 per cent graphitic carbon; 0.26 per cent manganese; 0.326 per cent phosphorus; 0.039 per cent sulphur and 1.25 per cent silicon. The iron is said to occupy a position in the metallurgical scale midway between malleable and gray iron.

A paper on the selection and use of refractories in the foundry was read by Walter H. Kelley. It stated that a perfect fire clay should analyze 53.27 per cent alumina and 46.73 per cent silica. Fire brick containing from 59 to 73 per cent silica will usually give trouble. Analysis, however, is not the only criterion in judging refractories. Physical structure also must be given consideration, for often the brick is called upon to resist severe abrasion and the scouring action of hot gases moving at high rates of speed.

A paper describing a cupola of new design was presented by G. R. Brandon, of the Whiting Foundry Equipment Co., Harvey, Ill. It is published in full elsewhere in this issue. Two other papers were read at the Tuesday afternoon session including "Safety First—Driving Back the Saloon", by Thomas D. West, and "The Two-Story Foundry", by G. K. Hooper. The former was published in THE IRON TRADE REVIEW in abstract, Sept. 10.

Report of Secretary-Treasurer

The report of A. O. Backert, secretary-treasurer, is as follows:

"Both in prestige and membership the American Foundrymen's Association made big gains during the last year and with a return of trade conditions to normal it is believed that an enrollment of 1,000 can be attained before our next annual meeting. On Sept. 1, the membership reached a total of 807, the high point in the history of the association, and a gain of 92 since July 1, 1913. During the year, 14 members were dropped for non-payment of dues and 12 resigned. An active campaign for new members was conducted during the months of June and July, the results of which were particularly gratifying.

"The present secretary-treasurer assumed the duties of his office April 1, 1914, when the records, bound volumes, etc., were turned over to him by the retiring secretary-treasurer, Dr. Richard Moldenke. The records of the office were so well maintained and so complete, that no difficulty was experienced in carrying on the work, and therefore no break occurred in the conduct of the affairs of the association while the transfer was being made. Furthermore, Dr. Moldenke co-operated with the secretary-treasurer in every possible way and his unselfish spirit of helpfulness greatly lightened the burdens of the secretarial office.

"For the first time in the history of the organization, the secretary was relieved of the tremendous amount of work entailed in securing papers and arranging for the program for the annual meeting. At our last convention, former President H. D. Miles appointed a committee on papers and program, and the excellent manner in which the work has been done is reflected in the long list of magnificent papers and addresses that are to be presented for your consideration. In this work, J. J. Wilson, of Detroit, chairman, was ably assisted by H. B. Swan, and to promote the interest of some of the world's leading metallurgists in your society, Mr. Swan visited Albany, Boston and New York in his quest for papers from scientists of world-wide fame. This first experiment with a committee on papers certainly warrants its continuation and the gratifying results obtained merit widening the scope of the committee work of the organization.

"The affairs of the world's leading technical societies largely are conducted by committees and the number of committees of the American Foundrymen's Association should be greatly increased. In the appointment of members to carry on such work, care should be exercised to localize them as far as possible, thereby reducing traveling and incidental expenses.

"Owing to the fact that the duties of the former treasurer were terminated on March 31, 1914, financial statements are shown covering the period from July 1, 1913, to March 31, 1914, and from April 1, 1914, to June 30, 1914. The combined statement shows total receipts of $6,391.14, and disburse-

ments of $6,315.31, leaving a balance in the treasury on July 1, of $75.83. The cost of the Transactions was $3,371.05, and it is believed that this expenditure will be greatly increased in the publication of Volume XXIII, as there is every indication that this will contain approximately 800 pages. It, therefore, is absolutely essential that the revenue of the association be greatly increased and the only method by which this can be accomplished at present is by the enrollment of new members."

The secretary's report included the following table showing the growth in the membership of the American Foundrymen's Association since its inception:

Convention number.	Year.	Number of members.	Place of meeting.
1	1896	345	Philadelphia
2	1897	486	Detroit
3	1898	566	Cincinnati
4	1899	310	Pittsburgh
5	1900	341	Chicago
6	1901	297	Buffalo
7	1902	314	Boston
8	1903	317	Milwaukee
9	1904	278	Indianapolis
10	1905	294	New York
11	1906	300	Cleveland
12	1907	532	Philadelphia
13	1908	715	Toronto
14	1909	724	Cincinnati
15	1910	753	Detroit
16	1911	692	Pittsburgh
17	1912	626	Buffalo
18	May 1, '13	715	Chicago
19	Sep. 7, '14	807	Chicago

Committee on Industrial Education

The report of the committee on industrial education, by Paul Kreuzpointer, chairman, stated that six states thus far have inaugurated definite systems for the organization and supervision of industrial schools, including Pennsylvania, Wisconsin, Indiana, Massachusetts, New York and New Jersey. Decided progress has been made in the establishment of numerous corporation schools. The report discusses corporation schools at length, taking up their functions, the subject matter taught and their relation to the public school system. Continuation schools also are considered. The proper courses of study for continuation schools are outlined and the attitude of the school men toward them is discussed.

Malleable Session

One entire session, Wednesday afternoon, was given over to malleable foundry problems. It was notable for the number and variety of the papers, the spirit of the discussion and the character of the attendance. The American Foundrymen's Association has held special sessions on steel foundry practice at a number of conventions, but this was the first time similar efforts were made for the malleable foundrymen. The results were gratifying. Prominent malleable men from all parts of the country were on hand and took part in the proceedings. The western section of the American Malleable Castings Association held a meeting in Chicago in the morning and adjourned practically *enmasse* to the Stock Yards Inn in the afternoon.

"Calculating Mixtures for Malleable Iron", a paper by Harrold Hemenway, Moline, Ill., treated briefly of the elements entering into the manufacture of malleable castings and explained fully a system of calculating mixtures. There are five elements that enter into the composition of malleable iron, two of which are classed as negative and three as positive. The negative elements are sulphur and phosphorus and the positive elements are silicon, carbon and manganese. Of the latter silicon is the one on which the greatest dependence is placed. The method of calculating mixtures which the author explained in considerable detail is simple and easily understood and is applicable to a wide range of conditions. The silicon contents may be easily manipulated and the method is adapted to heats of any size.

A paper on the effect of varying silicon and carbon in malleable mixtures was read by A. L. Pollard. It was published in abstract in the Sept. 10 issue of THE IRON TRADE REVIEW.

Tests of Malleable

An interesting defense of the quality of the inner portions of malleable castings was made by Enrique Touceda in order to refute the statements sometimes made that malleable iron owes its good features entirely to the treatment given the skin. Mr. Touceda made a series of tests on malleable castings as they were received from the foundry and also on castings that had been machined so that all of the outer skin was removed. These tests indicated that the metal in the core of properly made malleable castings is of superior quality and sufficiently ductile for all ordinary purposes.

"Malleable Iron—Its Manufacture, Characteristics and Uses", by J. P. Pero, Missouri Malleable Iron Co., East St. Louis, Ill.

This paper detailed the early history of malleable iron with particular reference to the growth of this industry in United States. Air furnace practice is described and the difference between the terms "shrinkage" and "contraction" in malleable nomenclature is pointed out. Details are given regarding the annealing process and it is particularly pointed out that heavy sections can be annealed as thoroughly as light ones.

In conclusion, this paper contained the following suggestive paragraphs:

"If the consumers of malleable iron castings would co-operate a little more closely with the malleable iron foundrymen in designing their castings, much good would be accomplished, as frequently the failure of malleable iron castings is largely due to their being improperly designed, causing shrinkage flaws or undue strains which have weakened the castings. Co-operation of this kind would not only result in better castings but in cheaper ones, as it would in a large measure obviate one of the principal sources of loss in the malleable iron foundry, due to cracked castings, cracking being caused by unequal strains while cooling in the mold.

"Instead of getting up elaborate specifications by far the best precaution is to have a test lug cast upon every piece, which can be broken to determine whether the malleable casting is thoroughly annealed without in any way injuring or destroying the efficiency of the casting."

"Researches in the Annealing Process for Malleable Castings", a paper by Oliver W. Storey, is, in abstract, as follows:

From the results obtained by E. L. Leasman and reported at the 1913 meeting of the American Foundrymen's Association in a paper entitled "A Study of the Annealing Process for Malleable Castings", the author has been able to make a more extended investigation of the exact nature of the reactions occurring in the annealing of white iron. The results of this investigation are presented in this paper.

In his work Mr. Leasman investigated the influence of the following variables upon the structure of malleable iron: Packing materials, temperature of annealing, time of annealing and rate of cooling. The results of the more extended investigation made by the author on this subject follow:

1.—The critical range of cooling malleable iron is between 700 and 775 degrees Cent.

2.—Below 700 degrees Cent. no decomposition of iron carbide occurs.

3.—All malleable iron must be cooled slowly to 700 degrees Cent. to insure a complete breakdown of the iron carbide.

4.—Increasing the percentage of silicon will increase the upper limit, while increasing the manganese will decrease it. In addition to the experiments upon malleable iron, similar experiments were made upon gray cast iron. Similar results were obtained, though the upper temperature limits were higher, probably due to a higher silicon content.

Interesting Discussion

The foregoing papers were discussed in a group. President Howell asked Mr. Pero why malleable is considered superior to gray iron for stove castings. The latter replied that it is preferred on account of its indestructibility and also because it stands heat better without disintegrating, having been annealed at about 900 degrees Cent. Malleable, however, he pointed out, is used principally for

the frames, doors, water backs, etc., in stoves.

Mr. Hemenway's method of calculating mixtures was criticized by Enrique Touceda on the ground it is too indirect and complex. J. P. Pero also questioned the value of the method, because it is based entirely on the silicon content without direct reference to the manganese and sulphur, which are important elements. Mr. Hemenway replied that in cases where his calculations are tabulated in the form of heat cards, figuring up a mixture is a very simple problem. He also stated that the manganese and sulphur contents can be properly taken care of by a correct adjustment of the grades of pig iron used.

With further reference to the subjects of manganese and sulphur, another speaker asked, "What are the safe limits of manganese in relation to sulphur for various grades of annealing?" Mr. Touceda replied there must always be a definite relation between these two elements and that the manganese should be kept between 0.2 and 0.35 per cent for satisfactory results. Mr. La Rue stated that a heat in his foundry was ruined by allowing the manganese to rise to 0.60 per cent by mistake. "Good results," he said, "are obtainable with manganese as low as 0.23 and as high as 0.38 per cent, the sulphur being kept under 0.05 per cent."

The same speaker was of the opinion that malleable iron, as a rule, is poured at a lower temperature than gray iron. This view was disputed by Messrs. Pero and Touceda, the latter stating that malleable melts at about 2,350 degrees Fahr., and gray iron at approximately 2,250 degrees. Stanley G. Flagg Jr. said that some tests made of temperatures at the cupola spout with a radiation pyrometer indicated that the gray iron was 300 degrees hotter. Another speaker said that radiation pyrometer readings indicated that castings of the same metal sections were poured at the same temperature, whether gray iron or malleable, namely from 2,400 to 2,600 degrees Fahr. Some doubt was expressed, regarding the accuracy of these results owing to the difficulty of making close readings with a radiation pyrometer under certain conditions.

Standard Ladle Nozzles

The outstanding feature of the steel foundry session Wednesday morning, presided over by R. A. Bull, senior vice president, was the report of the committee on steel foundry standards. This report is significant not only for its intrinsic value but because it marks the first step in a new policy, namely that of treating subjects of an important nature through committee investigations and reports. The steel foundry standards committee was appointed at the 1913 convention as a result of a paper by R. A. Bull entitled "Some Difficulties in Pouring Steel Castings", and a discussion by John Ploehn, French & Hecht, Davenport, Ia. The committee report is published in full elsewhere in this issue and the 10 standard nozzle designs are described and illustrated. Upon motion of A. W. Gregg, Bucyrus Co., South Milwaukee, the report was accepted and it was recommended that the members adopt the standard designs for use in their foundries. W. A. Janssen, Bettendorf Co., Davenport, Ia., suggested that stopper rods should be standardized to fit the nozzles. It was pointed out, however, that there is much less variation in stopper rods than in nozzles and no difficulties are expected from this source.

Electric Melting

Electric steel melting received its full share of attention. A paper entitled "The Electric Furnace in the Steel Foundry" was read by W. L. Morrison, Welland, Ont., and electric melting also was touched upon by A. F. S. Blackwood in his paper on the melting characteristics of acid steel castings. Mr. Morrison's paper was published in abstract in the Sept. 10 issue of THE IRON TRADE REVIEW.

In response to a question if electric steel is better than basic open-hearth material of the same analysis, Mr. Morrison replied that it is 25 per cent stronger due to less tendency toward segregation. F. T. Snyder, Metallurgic Engineering Co., Chicago, explained the reason for the superior strength of electric steel in some detail. His explanation was based on the theory that molecules are flat rotating discs, something like poker chips. They have many different axes of rotation under normal conditions. In electric steel, the molecules have a tendency to conform to one dominant plane, and are, therefore, packed together more densely than in ordinary steel. Paul Kreutzpointner, Altoona, Pa., explained the strength of electric steel on the ground of increased density due to the absence of gases and other impurities. Mr. Baldwin stated that in his experience, the tensile strength of electric steel is very little greater than ordinary carbon steel, but the elastic limit is from 60 to 65 per cent greater. G. J. Stock, Darlington, Eng., intended to submit a written discussion but was prevented by the confusion abroad resulting from the war. For a similar reason, Prof. T. A. Louden, Toronto, Can., was unable to complete his paper on making steel direct from ore in the electric furnace. It is probable this will be given next year.

Lining Converters With Ganister

"Ganister Lining in Side Blow Converters", by John Gregson, Sivyer Steel Casting Co., Milwaukee, is abstracted as follows:

The Sivyer Steel Casting Co. has substituted a complete ganister lining for silica brick in its one-ton side-blow converter, with unusual success. The ganister lining has a number of advantages over silica brick. In a one-ton converter the cost of the ganister is about the same as the brick, but there is a big saving of time and material in the daily repairs when the former is used. In one shop where a two-ton converter with a ganister lining is used, an average of eight blows, five days a week, has been maintained for months. It is frequently possible to run an entire week without touching the tuyeres, and no repairs inside the vessel are necessary save small patches on the belly. In a one-ton converter, the same bottom and tuyeres often last four days, with an average of 30 to 36 blows. In addition to explaining the advantages of ganister lining, this paper gives instructions regarding its proper installation in the converter.

In a discussion of this paper, S. D. Sleeth, Westinghouse Air Brake Co., Pittsburgh, asked how much clay is mixed with the ganister as a binder. Mr. Gregson responded that as little as possible is used in order to preserve the refractory qualities of the lining, the proportions ranging from 5 to 10 per cent.

Mr. Blackwood's paper on melting characteristics of acid steel, which was mentioned above, describes the crucible, converter, open-hearth and electric processes, including details of furnace construction and suggestions regarding the proper manipulation of heats. Many practical suggestions are given in the paper covering the lining of furnaces, charging, tapping, etc. The production of manganese steel is described and various types of side blow converters are discussed. The paper concludes with a resume on electric furnace construction and operation.

Further discussion of electric furnace practice followed the reading of this paper. Mr. Snyder disputed Mr. Blackwood's statement that his furnace is adaptable only for very small units. He said that a furnace built by the Metallurgic Engineering Co., which is now in operation, has a capacity of 190 tons per 24 hours with the melting chamber lined to 6 feet in diameter. The present owner of the

furnace has lined it to 5 feet, somewhat reducing the production. Mr. Blackwood inquired how sufficient heat could be obtained to handle such quantities of metal, intimating that most of the heat was produced by radiation from the electrode. Mr. Snyder explained the heat comes primarily from the arc and not from the electrode. The arc, he said, is 14 inches long in the larger furnaces and on account of its length is comparatively cool. This arc partakes somewhat of the nature of the open-hearth flame and a conception of the amount of heat available can be gained from the statement that 800 kilowatts are dissipated in an arc 8 inches long and 2 inches in diameter. This type of arc, Mr. Snyder claimed, reduces the electrode cost and also refractory cost, the latter being from 50 to 60 cents per ton of steel.

Defects in Steel Castings

"Defects in Steel Castings and Remedies for Them," an exhaustive paper by John Howe Hall, consulting engineer, New York, was abstracted in the Sept. 10 issue of THE IRON TRADE REVIEW. A. H. Janssen discussed Mr. Hall's paper at length emphasizing the point that in order to produce good steel it is necessary to use good raw materials and have good iron. He suggested that the American steel makers pay more attention to the quality of scrap and pig iron that they use. He also claimed they are inclined to pour their metal too fast. This results in spongy castings because the mold is not always full when the steel appears in the riser. This is due to the fact that the laws of fluid pressure are operative only as long as steel remains liquid and cease when it becomes plastic, which sometimes happens very soon after it leaves the ladle. Another speaker asked how the multiple gates at different levels, suggested by Mr. Hall, should actually be made. In reply, it was suggested that the gates slope upward so that the metal will not flow through the upper gates until it has reached their level in the mold.

A. F. Stirling Blackwood, president, Michigan Steel Castings Co., Detroit, said that in considering pipes and other cavities due to contraction, the different conditions surrounding the cooling of castings and ingots should be remembered. In an ingot, segregation results simply from the flow of contraction and is regular in character owing to the regular shape of the ingot. Mr. Blackwood condemned the use of chills against steel castings and was upheld in his contention by John Ploehn, who suggested that the use of chills usually can be avoided by making slight alterations in the pattern.

"Annealing and Heat Treating Steel Castings," by Wm. Campbell, Columbia University, New York City, was read by title.

Gray Iron Session

The final session Thursday afternoon was devoted almost entirely to the discussion of gray iron foundry problems. The principal feature was a paper on "Cast Iron With Unusual Structure," by K. W. Zimmerschied, Detroit, which was published in full in THE IRON TRADE REVIEW, Sept. 10. Great interest was expressed in the extraordinary characteristics of Mr. Zimmerschied's iron. The gist of the rather extended discussion which followed the presentation of the paper by H. B. Swan, was that the iron owed its qualities largely to the high percentage of combined carbon and sulphur. The silicon also is high but the precipitation of graphite which usually accompanies high silicon is prevented by the comparatively large amount of sulphur, this element averaging 0.136 per cent. In response to a question, Mr. Bauer, Rogers, Brown & Co., Chicago, suggested the use of high silicon Bessemer pig iron and high sulphur coke in order to duplicate this iron. This information was supplemented by Mr. Swan, who said that the mixture contained 10 per cent steel scrap. It was pointed out that the iron described by Mr. Zimmerschied cannot be produced cheaply.

Ben. D. Fuller, Westinghouse Electric & Mfg. Co., Cleveland, said too much stress usually is laid on the silicon and sulphur in pig iron without proper regard for the total carbon. He suggested the use of an iron in which the total carbon is high, running 3.75 per cent, the silicon averaging 2 per cent. S. D. Sleeth corroborated Mr. Fuller's remarks and said it was his custom to specify the total carbon in pig iron, allowing the silicon to run down to 1.9 per cent or possibly less.

Coke Recovered from Cupola

"Iron and Its Properties" by Peter F. Blackwood, Michigan Steel Castings Co., Detroit, was read by title, together with two other papers, "Green Sand Cores," by James Mulvay, Troy, N. Y., and "Coke Recovered From the Cupola Dump," by W. J. Keep, Detroit. The abstract of the latter paper is as follows:

It was found that when coke is only partially burned, the combined portion is higher in ash and lower in sulphur than the original coke. The ash, if undisturbed, will not fall off while the coke burns. Only 1 per cent of the sulphur in the coke remains in the ash, the rest passing off in gas. Whether any of the sulphur is absorbed by the iron and if so, what amount, can best be determined by work on a cupola in actual operation. This paper originally was submitted for publication in *The Foundry*, but owing to the importance of the results obtained, it was concluded to first present it to the American Foundrymen's Association.

Paul Kreutzpointner, Altoona, Pa., presented a report on his participation in the Fifth Annual Conservation Congress, Washington, Nov. 18-20, 1913, where he represented the American Foundrymen's Association.

"A Memorandum on the Preparation of Standard Specifications for Cast Iron for International Export Use", by Dr. Richard Moldenke, Watchung, N. J., is abstracted as follows:

The author describes the first actual progress made in the preparation of international standard export specifications. Thus far all efforts failed because an effort was made to bring the standard specifications of each of the interested countries into line, particularly so far as steel was concerned, the different methods of preparing materials, governmental control of transportation, etc., and particularly the tender care exhibited for invested capital on the part of foreign nations. This made it most difficult to secure harmony of action to date.

The paper gives the history of the situation for pig iron, cast iron pipe and the international test bar for valuing castings for export. It describes the bringing about of definite proposals by the International Committee and the prospect of final action at the coming St. Petersburg Congress of the International Association for Testing Materials, to be held in August, 1915.

In discussing this memorandum, Mr. Hopkins, of the United States Cast Iron Pipe & Foundry Co., read a letter from a representative of the English cast iron pipe makers stating that the international specifications which have been proposed are not satisfactory. Mr. Hopkins also stated that the American manufacturers are not in sympathy with the European method of increasing the strength of the pipe by reducing the inside diameter, maintaining the outside diameter constant. It is said this would compel manufacturers in this country to carry too many sizes of core bars.

Election of Officers

The annual business meeting and election of officers took place at the La Salle hotel, Friday morning, and the following officers were unanimously elected for the ensuing year: R. A. Bull, Commonwealth Steel Co., Gran-

ite City, Ill., president; H. E. Field, Wheeling Mold & Foundry Co., Wheeling, W. Va., senior vice president; A. O. Backert, *The Foundry*, Cleveland, secretary-treasurer; Henry A. Carpenter, General Fire Extinguisher Co., Providence, R. I., Walter Wood, R. D. Wood & Co., Philadelphia, S. B. Chadsey, Massey-Harris Co., Ltd., Toronto, Ont., T. W. Sheriffs, Sheriffs Mfg. Co., Milwaukee, J. P. Pero, Missouri Malleable Iron Co., East St. Louis, Ill., Alexander T. Drysdale, Sheffield Cast Iron Pipe & Foundry Co., Sheffield, Ala., J. J. Wilson, Cadillac Motor Car Co., Detroit, A. H. Thomas, Buckeye Steel Castings Co., Columbus, and Ben D. Fuller, Westinghouse Electric & Mfg. Co., Cleveland, O., vice presidents.

Before retiring, President Howell announced the following standing committees for the ensiung year:

Papers.—H. R. Swan, Cadillac Motor Car Co., Detroit, chairman; A. O. Backert, *The Foundry*, Cleveland; S. B. Chadsey, Massey-Harirs Co., Ltd., Toronto, Ont.; John Howe Hall, consulting engineer, New York City; J. P. Pero Jr., Franklin Park Foundry Co., Franklin Park, Ill.; D. W. Sowers, Sowers Mfg. Co., Kokomo, Ind.; O. J. Abell, *Iron Age*, Chicago.

Steel Foundry Standards.—Dudley Shoemaker, American Steel Foundries, Indiana Harbor, Ind., chairman; A. H. Janssen, Bettendorf Co., Davenport, Ia.; Ralph H. West, West Steel Castings Co., Cleveland; L. A. Way, Duquesne Steel Castings Co., Coraopolis, Pa.; A. H. Thomas, Buckeye Steel Castings Co., Columbus, O.; A. F. Stirling Blackwood, Michigan Steel Castings Co., Detroit.

Specifications for Foundry Scrap.—S. D. Sleeth, Westinghouse Air Brake Co., Pittsburgh, chairman; Alex W. Thomson, H. W. Caldwell & Sons Co., Chicago; W. J. Keep, Detroit; H. Cole Estep, THE IRON TRADE REVIEW, Cleveland.

Safety and Sanitation. — A. W. Gregg, Bucyrus Co., South Milwaukee, chairman; Thomas D. West, West Steel Castings Co., Cleveland; F. H. Elam, American Steel Foundries, Chicago; Arthur T. Morey, Commonwealth Steel Co., Granite City, Ill.; M. W. Alexander, General Electric Co., West Lynn, Mass.

Costs.—Ben D. Fuller, Westinghouse Electric & Mfg. Co., Cleveland, chairman; B. J. Walker, Erie Malleable Iron Co., Erie, Pa.; H. O. Lange, Ferguson & Lange Foundry Co., Chicago; E. G. Felthausen, Acme Steel & Malleable Iron Co., Buffalo, N. Y.; Harrington Emerson, Emerson Co., New York City.

Committee to Work in Conjunction With American Society for Testing Materials on Specifications.—(1) *Gray Iron*, J. J. Wilson, Cadillac Motor Car Co., Detroit; W. P. Putman, Detroit, and Richard Moldenke, Watchung, N. J. (2) *Steel*—R. A. Bull, Granite City, Ill.; W. C. Hamilton, American Steel Foundries, and W. G. Nichols, Edgar Allen American Manganese Steel Co., Chicago. (3) *Malleable*—Enrique Touceda, Albany, N. Y.; A. H. Jameson, Malleable Iron & Fitting Co., Branford, Conn., and F. E. Nulsen, Missouri Malleable Iron Co., East St. Louis, Ill.

Industrial Education.—Frank W. Leavitt, University of Chicago, Chicago, chairman; Dean Connelly, Carnegie Institute, Pittsburgh; Dean Snyder, State Commissioner of Education, New York City; C. E. Hoyt, Lewis Institute, Chicago; Edward A. Johnson, Wentworth Institute, Boston; Paul Kreutzpointner, Altoona, Pa.

Committee on International Meeting 1915.—Richard Moldenke, Watchung, N. J., chairman; Walter Wood, R. D. Wood & Co., Philadelphia; Thos. W. Devlin Devlin Mfg. Co., Philadelphia.

Constitution Amended

The report of the special committee to amend the constitution was presented at the Friday morning session and adopted. The amendments will be submitted to the membership for letter ballot. The principal change provides for associate membership, with annual dues at $5 per year, to which persons engaged in foundry work such as foremen, or firms and corporations having a commercial interest in foundry operations but not engaged in the production of castings are eligible. Employes of such firms also are eligible. A provision was adopted to charge an initiation fee of $5 for both classes of membership commencing May 1, 1915. The customary resolutions of thanks were adopted and the auditing committee reported that the books of the treasurer are in good shape. In accordance with the usual custom, Alfred E. Howell, the retiring president, was elected an honorary member. John A. Penton, the first secretary of the association, also was elected an honorary member.

Entertainment Features

Chicago maintained its reputation for abundant hospitality and an enjoyable entertainment program was provided. A boat ride, which included music and dancing, was tendered the visiting foundrymen on Tuesday evening. The ladies enjoyed a luncheon at Stock Yards Inn on Wednesday and also a banquet at La Salle hotel, Thursday evening. The Chicago Association of Commerce provided a special train which visited points of interest throughout the city on Friday afternoon.

The annual convention banquet was held Thursday evening at the La Salle hotel. H. O. Lange acted as toastmaster. Remarks were made by Alfred E. Howell, president, American Foundrymen's Association, and G. H. Clamer, president, American Institute of Metals. An address entitled "Some By-products of Commerce and Industry", was made by Dr. James H. Kirkland, chancellor, Vanderbilt University, Nashville, Tenn.

The Associated Foundry Foremen were tendered a banquet by the local committee on Monday evening, at which H. O. Lange presided. This association also held a meeting Thursday morning, at which a paper on the application of geometry to foundry work was presented and the following officers were elected for the ensuing year: Robert MacDonald, Samuel Moore & Sons Corporation, Elizabeth, N. J., president; J. A. Laucke, S. J. Gresswell Co., Philadelphia, Pa., vice president; Robert B. Thomson, 78 Verplanck street, Buffalo, secretary-treasurer.

The Meetings of the Institute of Metals

ATTENTION at the technical sessions of the American Institute of Metals was directed chiefly to subjects relating to the metallurgy of the various non-ferrous metals, and in particular to the use and possibilities of the electric furnace in melting these metals and their alloys. Papers on rolling mill practice, die castings and nomenclature were presented, and there were numerous reports in regard to the results of research work in laboratories. The Institute also held two joint sessions with the American Foundrymen's Association; these are covered elsewhere in this issue.

The report of the official chemist, Arthur D. Little, Inc., included a survey of the progress in the non-ferrous metal industry during the past year. About the usual number of new alloys and processes were patented, but attention has been directed more to working out details of present processes and improving upon old methods than to the blazing of new trails.

Considerable discussion was evoked by a paper on "Progress in the Nomenclature of Alloys", by G. K. Burgess. The author recommended that the advisory committee of the Institute give consideration to the recent report of the British Institute of Metals in regard to nomenclature. M. K. B. Patch favored a conference

with a committee of the British Institute of Metals, saying that a standardization of names in this country would only lead to confusion unless it were adopted simultaneously in all other English-speaking countries. W. H. Bassett introduced a resolution, which was adopted, asking that the advisory committee be requested to consider at its fall meeting the question of standardizing names of the various alloys.

Drop Pouring Process

E. A. Barnes read a paper on "Drop Pouring Process of Casting". The author describes a method of producing certain large navy bronze bell castings, averaging 239 pounds apiece. At first the regular method of pouring from crucibles was tried, but it proved unsatisfactory. The drop pouring method was finally adopted and as a result only 2 per cent of the resulting castings went into the discount.

De Courcy Browns submitted a paper on "Some Recent Applications of Metallic Cobalt". This described the results of tests on manganese bronze ingots to which 0.50 per cent cobalt had been added. This test, the author said, showed that the addition of cobalt considerably reduces the tensile strength, but at the same time increases the elongation and reduction of area. Jesse L. Jones submitted a paper on "Bull Run Talc", and Chas. Pack presented a paper entitled "Modern Die Casting Practice".

Rolling Mill Practice

At a special session, devoted to rolling mill practice, important papers were presented by A. B. Norton, one of these describing a new hot shortness testing machine for aluminum alloys, while the other was devoted to a method of making aluminum test specimens. The test machine described is very simple in principle, a test specimen being cast in the sand in such a manner that as it contracts during solidification, it lifts a weight, previously supported, or cracks in the attempt. Other conditions being the same, the metals which withstand the greatest stress without cracking, show the least tendency to crack in the foundry. In discussing this paper, E. B. Horne stated that even if a test bar is put on a casting it is possible to influence its physical characteristics so that they will differ from those in the metal of the casting itself. If the metal passes through the casting to form the test bar, it will show more strength, due to the fall in temperature, than where the metal enters the test bar direct without first passing through the mold.

C. P. Karr presented a paper entitled "Standard Test Bars for Zinc-Bronze, Copper 88, Tin 10, Zinc 2". In discussing this paper, M. K. B. Patch said that the first essential in getting a good test bar is to feed the metal properly into the casting. G. H. Clamer was of the opinion that it was impossible under any circumstances for a test bar to show the same characteristics as the metal in the casting. In order to get as good a test bar as possible, he recommended that the test piece be attached to the casting. H. W. Gillet said that chilled bars were desirable only for use in determining the properties of alloys and that he would not recommend their use for indicating the characteristics of sand-cast castings.

G. E. F. Lundell and Mai Kim Bee presented a paper entitled "A New Method for the Determination of Zinc in Alloys". By this method such determination may be made in a period of 1½ hours.

Following the reading of this paper, F. H. Schutz took occasion to describe a method which he recently devised for successfully turning out aluminum castings capable of withstanding pressure of 300 pounds per square inch. In making these castings, of No. 12 aluminum, he obtained satisfactory results by using nitrate of potash as a flux.

New Officers American Institute of Metals

President.

G. H. Clamer, Ajax Metal Co., Philadelphia, re-elected.

Vice Presidents.

R. B. Wallace, National Cash Register Co., Dayton; Robert Job, Milton-Hersey Co., Montreal; W. G. Harris, Canada Metals Co.; Jesse L. Jones, Westinghouse Electric & Mfg. Co., Pittsburgh; George C. Stone, New Jersey Zinc Co., New York; W. H. Bassett, American Brass Co.; Fred Moerl, Pullman Co., Chicago; J. G. Kasjens, Brass Foundry Co., Peoria, Ill.; H. W. Gillett, Bureau of Mines, Ithaca, N. Y.; E. B. Horne, Packard Motor Car Co., Detroit.

Secretary-Treasurer.

W. M. Corse, Titanium Alloys Co., Niagara Falls N. Y., re-elected.

Metallurgy and Metallography

Several important papers relating to metallurgy and metallography in connection with non-ferrous metals were presented. These embraced copper, spelter, tin and antimony. One of the most important was that on copper by Lawrence Addicks, of Phelps, Dodge & Co. Mr. Addicks described the various forms in which copper appears in nature and the three general methods which are employed in converting copper ore into crude or refined copper. He also described methods of refining, and discussed the characteristics and properties of lake, electrolytic and casting copper.

Price of Lake Copper

Following the reading of Mr. Addick's paper, an interesting discussion developed in regard to the selling price of lake copper. G. H. Clamer started this discussion by inquiring of W. H. Bassett, as representative of the largest consumer of copper in the country, why lake copper sells at a premium over electrolytic, if, as Mr. Addicks had contended, lake copper contains no superior qualities. Mr. Bassett stated that this question had been much discussed among the large consumers of copper and that the general opinion on the part of these interests is that lake copper should sell at the same price as electrolytic. The lake producers, however, claim superior qualities over electrolytic. It is claimed lake copper is of a fibrous nature, which gives rise to greater ductility and tensile strength, but this matter is open to considerable argument.

Ernst Jonson submitted an important paper on experience with forgible brass during the construction of the Catskill aqueduct. Season-cracking, he said, seems to be due in some cases to another reason than decrease in the strength produced by sudden exposure to low temperatures. This is corrosion of the weather. Certain kinds of corrosion, said Mr. Jonson, greatly reduce the cohesion of the affected part of the material, thus destroying the ductility.

Geo. C. Stone, New Jersey Zinc Co., New York, submitted a paper entitled "Spelter Manufacture and Its Properties". The writer, in considerable detail, described the practice which is customary among spelter producers in this country, illustrating his talk by means of numerous lantern slides. W. A. Cowan, National Lead Co., submitted a very interesting paper on "The Metallurgy of Tin and Antimony". F. O. Clements presented a paper entitled "The Effect of Repeated Remelting on Copper", published in The Iron Trade Review, Sept. 10.

Electric Furnaces for Brass Foundries

S. L. Hoyt read a paper on "Ternary Alloys of Copper, Tin and Zinc". This set forth the results of research work, which the author described in a paper presented before the British Institute of Metals last year. Dr. Herbert G. Dorsey, in a paper entitled "Tests on Electric Furnaces for Brass Foundries", set forth the experience of the National Cash Register Co. in using an electric furnace for melting brass. The company purchased a German furnace and experi-

mented with it for some time. Fifty-five different heats were run; considerable trouble was encountered due to the failure of the crucible to stand up under the work, and to other causes. The company expects to make certain changes in its construction to the end that its efficiency may be increased.

Ernst M. Schmelz submitted a paper describing a new type of electric furnace, which is recommended for use in melting metals and metal alloys. This furnace is an evolution of the well-known Stassano furnace. The double chamber, which was a feature of the Stassano furnace, designed to treat copper ore, has been done away with and the thermal efficiency increased. The new furnace can be designed for the use of either direct or alternating current, either single or three-phase and with a voltage of 75 to 220 volts. The author sets forth figures obtained from the Titanium Alloys Mfg. Co., Niagara Falls, N. Y., which is operating a furnace of this type. It melted 1,000 pounds of red copper in less than two hours, using current at the rate of 0.12 kilowatt-hours per pound.

The interest manifested in the future of the electric furnace by electric power companies who hope through the development of such apparatus to open up a new field for the disposal of current in off-peak hours, was reflected in a paper submitted by H. M. St. John, of the Commonwealth Edison Co., Chicago.

Melting Practice

H. W. Gillett, of the Bureau of Mines, Ithaca, N. Y., opened the session on melting practice by reading a paper on "Melting Losses in Electric Brass Furnaces". In their work, Mr. Gillett and his associates had not sought to test one type of furnace against another, but simply to determine from experiment if any type of furnace using the electric current for heating can make sufficient saving in metal losses to overcome the high cost of current under present conditions. The conclusion from the tests was that losses in the electric furnace range from one-third to one-half those in a fuel-fired furnace. The conclusion is reached also that 75 per cent of the losses occur in pouring.

E. R. Guenther presented his paper on "The Use of Producer Gas for Melting Yellow Brass", in which he gave results of using this fuel instead of fuels heretofore employed. High efficiency has been attained and experiments have shown this gas is excellent for the purpose. It can be used at low pressure, with or without preheating.

Fred L. Wolff gave briefly his conclusions as embodied in his paper on "Tests of Natural Gas-Fired Furnaces Under Factory Conditions". The matter of a proper burner has been given much attention, but no definite recommendations yet can be made. Cheapness of natural gas in regions where it is obtainable commends it, but the precariousness of the supply prevents costly equipment being built for its use.

G. H. Clamer described a type of electric furnace in use for brass melting which has been giving excellent results. In this furnace the heat is applied from the bottom of the bath and is conserved by unusually thick walls.

Data which he submitted showed an average of 38 cents per 100 pounds as the cost of melting brass in a coke furnace, while in this particular electric furnace the cost is but 20 cents per 100 pounds.

Foundry in Receivership

Upon the application of creditors at Philadelphia, Sept. 9, Paul Clayton was appointed receiver of Isaac A. Sheppard & Co., manufacturers of stoves and small castings with a foundry at Erie avenue and Sepviva street, Philadelphia. The receiver was placed under bond of $50,000. The assets of the company are given at $1,000,000 and the liabilities at $500,000. Inability to make collections because of financial stringency produced by the war is ascribed as the cause of the failure. The company was formed 54 years ago.

At New York, Sept. 10, Mr. Clayton also was appointed ancillary receiver to protect the assets of the company in that district. The Sheppard company has a branch office at 109 Beekman street, New York City. The original action in equity, bringing on the receivership, was filed at Philadelphia by the Niagara Radiator Co., Tonawanda, N. Y.

Foundrymen Enjoy Clambake

About 50 members of the New England Foundrymen's Association and their friends, enjoyed the clambake given at Riverside Park, Springfield, Mass., Wednesday, Sept. 9. The affair was carried out with all the appointments and solid enjoyment that typifies the New England clambake. The visitors were met at the train in Springfield by the committee in charge in automobiles and were taken to the dock where a steamer was boarded for a short sail up the Connecticut river to the site of the day's festivities. Following the bake, the party took in the various amusements of the park. A short meeting was held and speeches were delivered by Chas. L. Newcomb, of the Dean Steam Pump Works, Holyoke, Mass., a member of the special committee on arrangements, by Henry Carpenter of the General Fire Extinguisher Co., of Providence, R. I., and others. Returning to Springfield, a buffet lunch was served at the Hotel Worthy. Music was rendered by a picked quartette.

Gain Made

In Unfilled Tonnage of Corporation—Shipments Were Large

For the third successive month, the Steel Corporation was able to show an increase of unfilled tonnage for its operations during August, according to the monthly statement issued at New York, Sept. 10. The booked orders on August 31 were shown to be 54,742 tons in excess of those upon July 31. The total order book of the Steel Corporation on August 31, was 4,213,381 tons, compared to 4,158,589 tons on July 31. The increase of August over July makes a total gain of 215,171 tons, as compared with May 31. The gain during the month just closed was netted in the face of increased production and shipments. A statement of the unfilled tonnage of the Steel Corporation, showing the changes in tonnage and percentage by months, since the plan of announcing monthly the business on hand was adopted, follows:

Date.	Total.	Change, tonnage.	Change, per cent.
Aug. 31, 1914....	4,213,381	54,742+	1.32+
July 31, 1914....	4,158,589	125,732	3.12+
June 30, 1914....	4,032,857	34,697+	0.86+
May 31, 1914....	3,998,160	278,908—	6.98—
Apr. 30, 1914....	4,277,068	376,757—	8.09—
Mar. 31, 1914....	4,653,825	372,615—	7.42—
Feb. 28, 1914....	5,026,440	412,760+	8.95+
Jan. 31, 1914....	4,613,680	331,572+	7.74+
Dec. 31, 1913....	4,282,108	114,239—	2.59—
Nov. 30, 1913....	4,396,347	117,420—	2.60—
Oct. 31, 1913....	4,513,767	490,018—	9.79—
Sep. 30, 1913....	5,003,785	219,683—	4.24—
Aug. 31, 1913....	5,223,468	175,888—	3.03—
July 31, 1913....	5,399,356	407,965—	7.03—
June 30, 1913....	5,807,317	517,005—	8.18—
May 31, 1913....	6,324,322	654,440—	9.38—
Apr. 30, 1913....	6,978,762	490,194—	6.55—
Mar. 31, 1913....	7,468,956	187,758—	2.45—
Feb. 28, 1913....	7,656,714	170,654—	2.18—
Jan. 31, 1913....	7,827,368	104,796—	1.32—
Dec. 31, 1912....	7,932,164	79,281+	1.01+
Nov. 30, 1912....	7,852,883	258,502+	3.40+
Oct. 31, 1912....	7,594,381	1,042,874+	15.33+
Sep. 30, 1912....	6,551,507	388,132+	6.29+
Aug. 31, 1912....	6,163,375	206,296+	3.46+
July 31, 1912....	5,957,079	149,773+	2.58+
June 30, 1912....	5,807,346	56,363+	0.98+
May 31, 1912....	5,750,983	86,983+	1.52+
Apr. 30, 1912....	5,664,885	360,044+	6.97+
Mar. 31, 1912....	5,304,841	149,359—	2.79—
Feb. 29, 1912....	5,454,200	74,479+	1.38+
Jan. 31, 1912....	5,379,721	294,960+	5.71+
Dec. 31, 1911....	5,084,761	942,806+	23.24+
Nov. 30, 1911....	4,141,955	447,627+	12.06+
Oct. 31, 1911....	3,694,328	83,011+	2.25+
Sep. 30, 1911....	3,611,317	84,668—	2.34—
Aug. 31, 1911....	3,695,985	111,900+	3.33+
July 31, 1911....	3,584,085	223,027+	7.16+
June 30, 1911....	3,361,058	247,871+	7.96+
May 31, 1911....	3,113,187	105,617—	3.28—
Apr. 30, 1911....	3,218,704	228,597—	6.63—
Mar. 31, 1911....	3,447,301	46,758+	1.37+
Feb. 28, 1911....	3,400,543	289,624+	9.31+
Jan. 31, 1911....	3,110,919	436,163+	16.30+
Dec. 31, 1910....	2,674,757	85,656—	3.09—
Nov. 30, 1910....	2,760,413	111,536—	3.88—
Oct. 31, 1910....	2,871,949	286,157—	9.12—
Sep. 30, 1910....	3,159,106	379,088—	10.74—
Aug. 31, 1910....	3,537,128	433,803—	10.92—
July 31, 1910....	3,910,931	286,863—	6.72—

Lowest Price

For Bar Iron Since 1898 — Puddlers' Wages Are Reduced

The bi-monthly examination of sales sheets from selected mills showed 1.09c as the average price of bar iron in July and August, according to an announcement after the regular meeting of the Western Bar Iron Association and the Amalgamated Association of Iron, Steel and Tin Workers, held Sept. 11 at Youngstown. That figure is the lowest disclosed since 1898. Puddlers' wages in September and October will be based on a 1.05c card, which entitles them to a rate of $5.60 a ton for boiling; that figure is 10 cents below any boiling rate obtained since March 1 last.

During January and February of this year, puddlers were paid $5.85 a ton for boiling on a 1.20c card (the average for bar iron sales in November and December of 1913); at the examination early in March, it was found that sales for the preceding two months had declined to the 1.15c card, and that figure again was disclosed at the meeting two months later, giving puddlers a rate of $5.70 for boiling in March, April, May and June. Sales in May and June dropped to the 1.10c card, but an advanced scale, accepted by mill owners about July 13, provided for a $5.70 boiling rate on a 1.10c card basis. If mill managers had not granted the advance, puddlers would now receive only $5.40 a ton for boiling instead of $5.60.

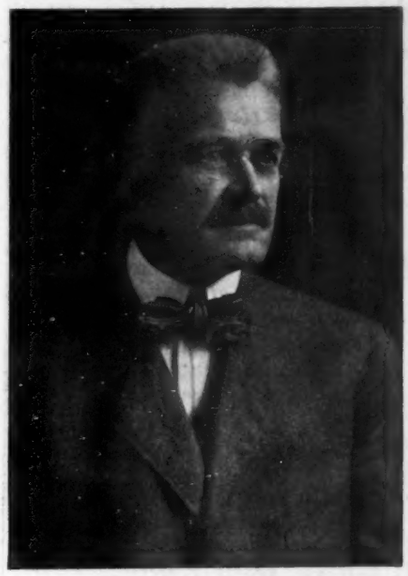
Boiling rates not only are comparatively low, but employment has not been steady for almost 12 months.

Obituaries

Joseph Lestrange Somers, aged 70 years, one of the first manufacturers of decorated tin boxes and signs in the United States, died at Mendham, N. J., Sept. 11. He began the manufacture of fancy tin boxes in Brooklyn at the close of the civil war. The business expanded until it became one of the largest of its kind in the world. Mr. Somers was a member of the Brooklyn Club and of the Manufacturers' Association of Brooklyn.

Charles W. Baird, who had been for many years a prominent factor in the industrial life of Detroit, died in his home in that city Sept. 8, after a long illness. Mr. Baird was 51 years of age and had lived in Detroit 27 years. He was born in Cincinnati, and when a boy, went from there to Indianapolis, where he lived several years. He was active in assisting in the organization of the Detroit Iron & Steel Co., of which he was secretary and treasurer from the time of its organization until his death. The first stack of this company was put in operation Feb. 15, 1904, and the second stack was blown in July 20, 1910. Mr. Baird was also a director of the Wakefield Iron Co. and the Federal Motor Truck Co., and was connected with the Solvay Process Co. He was a member of a number of clubs and was always actively interested in advancing the prosperity of Detroit.

William H. Pratt, president of The Illinois Steel Warehouse Co., whose death at his home in Kennilworth, Ill., Sept. 5, was announced in THE IRON TRADE REVIEW last week, was a man of marked ability and of strong individuality. Due largely to his influence, the Steel Corporation adopted the policy of



WILLIAM H. PRATT,
Late President of the Illinois Steel Warehouse Co.

selling from warehouses, which has been extended rapidly during recent years.

Paul A. E. Guerber, consulting engineer and general manager of the Guerber Engineering Co., Allentown, Pa., died Sept. 10, at Allentown, following a second operation for appendicitis. He was 53 years of age. He was educated in Paris and Switzerland and later graduated from Stevens Institute. In 1901, he established the Guerber Engineering Co.

The C. & C. Electric & Mfg. Co., of Garwood, N. J., has opened a branch sales office in the Security building, Minneapolis, with R. L. Wells in charge.

The Ingersoll-Rand Co., 11 Broadway, New York, has recently issued two new catalogs, Nos. 3024 and 3030, on the Ingersoll-Rogler air compressors. Catalog No. 3024 is a complete treatise on the Ingersoll-Rogler valve, and No. 3030 covers the class ER-1 type of compressor manufactured by this concern. Both catalogs are profusely illustrated showing the details of the machine.

Encouraging Reading of Trade Papers

Editor THE IRON TRADE REVIEW:

In reading over the issue of Sept. 3. we notice that the Shelby Steel Tube Co. has hit upon a plan whereby its men have access to the trade papers and in this connection we thought it might be interesting to you to know that over six years ago we provided reading rooms above the check room in the building through which the men pass to and from their work. In these rooms, we have on file two Philadelphia daily papers and several copies of the local morning paper.

Our trade papers, such as THE IRON TRADE REVIEW, *Iron Age, Machinery, Boiler Maker, Railway Age Gazette,* after being read by the executive force, are sent to the drawing room, where they are on file for a week or two and finally after leaving the drawing room, they are taken to the reading room, where they are left on file.

In addition to the trade papers, we have on file the latest copies of *Outlook, Popular Mechanics, Outing, Technical World, American Magazine, Cosmopolitan* and *Everybody's.*

Quite a number of our men carry their lunches and they are permitted to eat their lunch in the reading rooms. In addition to a large table in the reading room proper, we have an adjoining room with a number of small tables where the men can play games and we have found the rooms to be much appreciated by the men.

CHAMBERSBURG ENGINEERING CO.,
By H. S. Nixon,
Sales Department.
Chambersburg, Pa., Sept. 10. 1914.

Will Start Soon.—The Valley Mold & Iron Co., Sharpsville, Pa., will start the erection of a new ingot mold plant at Lebanon, Pa., at an early date, plans of which were described in a recent issue of THE IRON TRADE REVIEW. The company will obtain direct metal from the blast furnace plant of the Pennsylvania Steel Co., at Lebanon.

The Denver office of the Youngstown Sheet & Tube Co., Youngstown, O., in charge of F. S. Rutherford, district sales agent, has been moved from the Sugar building to 725-26 First National Bank building.

Business News from the Capital

President Wilson Says Attitude of Railroad Officials is "Big"

Washington, Sept. 15.—Filing of tariffs by railroads in Central Freight Association territory establishing freight rate increases of 5 per cent as authorized by the Interstate Commerce Commission in its decision in the 5 per cent case is expected to begin at once. By an order entered by the commission, these increases may become effective upon not less than ten days' notice, excepting rates on grain and grain products, advances on which must be made upon 30 days' notice.

Pressing demand of the railroads for increased revenue compelled the carriers to abandon the plan to undertake the readjustment of rates in that territory generally rather than to avail themselves at this time of the increases granted by the commission. These increases include all classes and commodity rates in Central Freight Association territory, excepting those on coal, coke, iron ore, brick, tile, clay, starch, cement and plaster.

This is one of the many steps to be taken immediately by the railroads to add to their revenue and to obtain as much relief as possible from the emergency in which they find themselves, greatly aggravated by the European war, which has depressed securities, those held abroad being valued at between $4,000,000,000 and $5,000,000,000.

The railroad presidents who held conferences here last week, one with President Wilson, and another with Commissioners Clark, Clements, McChord and Daniels of the Interstate Commerce Commission, intimated that their mission would result in good for them. President Daniel Willard of the Baltimore & Ohio, one of the six railroad heads attending the conferences, said in an informal statement that steps will be taken at once by the railroads to act upon suggestions and recommendations made by the commission in the 5 per cent case decision looking to increased revenues throughout official classification territory. The conferences, however, dealt with the railroad situation throughout the entire country. It was pointed out to the President, and later to the members of the Interstate Commerce Commission, that the emergency now faced by the railroads of the United States is by far more pressing than any which has heretofore existed. The President was urged to call the attention of the country to the "pressing necessity for support of railroad credit by the co-operative and sympathetic effort of the public and of all governmental authorities and that the railroads be relieved as far as possible of further immediate burdens involving additional expense." The President was also urged to obtain a "practical recognition of the fact that an emergency is upon the railroads which requires in the public interest that they have additional revenue and that the appropriate governmental agencies seek a way by which such additional revenues may be properly and promptly provided."

No specific suggestions for relief were made, although speculation was heard freely in different circles as to what action may be taken. Among the suggestions was that the Federal Reserve board may be asked to issue emergency currency on railroad securities and that credits of the roads be extended through Congressional action. The conference with the commission members was along the line of that which took place at the White House.

It is also believed that the roads which propose to carry into effect suggestions and recommendations made in the Eastern rate decision were urged by the commissioners to act at once. It will mean a reopening or a continuation of that case. This belief was strengthened by the statement of President Willard of the Baltimore & Ohio, which was made after the conferences were held.

Further consideration of the case by the commission, an exigency which was provided for when the hearings were begun, would take place under this plan. The suggestions and recommendations related to numerous matters, affecting official classification territory carriers throughout. These issues pertained to getting more revenue through proposed passenger rate increases, examination of certain freight rates, rules and regulations with a view to revision; elimination of so-called free services; increasing freight car efficiency; inaugurating further economies in different departments; sale of properties not used for transportation purposes, the value of which, upon incomplete reports, was estimated at $684,000,000 for official classification territory. Other suggested remedies were also named.

The President's Reply

President Wilson made it plain in a talk with callers that the reply he made to Chairman Trumbull of the Chesapeake & Ohio and Missouri, Kansas & Texas railroads, who acted as spokesman for the railroad representatives at the conferences, was all the action he felt he could take upon his own initiative. It was explained that it would not be proper for him to suggest to any governmental body what it should do. Apparently this was to clear up suggestions that he might beseech the Interstate Commerce Commission to take action to afford further relief to the railroads. The President indicated that the railroad men had made a good impression upon him and referred to their

Happenings at Washington Told in Condensed Form

Railroad presidents confer with President Wilson and members of Interstate Commerce Commission in regard to distressing situation of carriers. Denoting his sympathy, Mr. Wilson calls public attention to the matter, urging aid for roads, wherever feasible.

Federal Reserve Board, after discussing foreign exchange situation and bankers' recommendation that $150,000,000 *be raised by bankers of country to reopen foreign exchange market, concludes it may not be necessary to create the proposed fund in view of New York city's arrangement for financing its foreign indebtedness of* $82,000,000.

Conference between diplomatic and consular agents and United States banking and commercial representatives results in plan to relieve conditions in Latin-America, due to war, and building up of greater trade between this and Latin-American countries.

House adopts conference report on Federal Trade Commission bill, similar action having been previously taken by Senate.

Resolution adopted in Senate looking to establishment of international commission on ocean freight rates.

Following hearing of vesselmen before Senate commerce committee on seaman's bill, measure is referred to sub-committee.

River and harbor appropriation bill, after being strongly attacked, will probably be cut $20,000,000 *by action of committee.*

attitude of being "big," and devoid of criticism.

In his reply, the President refers to the facts laid before him by the railroad committee as being a lucid statement of plain truth and says he is glad, as requested, to call the attention of the country to the imperative need that railroad credits be sustained and the carriers helped in every possible way, whether by co-operative effort or by action, wherever feasible, of governmental agencies. The President says he is glad to do this because he thinks the need "very real." It is pointed out by the President that he cannot say that he entertains any deep anxiety about the matter, "except, of course, the general anxiety caused by the unprecedented situation of the money markets of the world; because the interest of the producer, shipper, the merchant, the investor, the financier, and the whole public in the proper maintenance and complete efficiency of the railways is too manifest." He expressed confidence that there will be active and earnest cooperation in this matter, "perhaps the one common interest of our whole industrial life."

"Undoubtedly," the statement adds, "men both in and out of official position will appreciate what is involved and lend their aid heartily wherever it is possible for them to lend it."

Recognizing that the emergency is in fact extraordinary, the President says that "where there is manifest common interest we ought all of us to speak out in its behalf and I am glad to join you in calling attention to it." He explains further that "this is a time for all to stand together in united effort to comprehend every interest and serve and sustain it in every legitimate way."

Victory for Steel Interests

Washington, Sept. 15.—Suspension from Sept. 15 until Jan. 13, by an order of the Interstate Commerce Commission, of the tariff providing new regulations and charges for carrying furnace slag, ashes, etc., from steel plants marks a victory for steel interests. The tariff covers 650 points in Pennsylvania, Ohio and West Virginia, including such places as Pittsburgh, the Shenango valley of Pennsylvania, the Mahoning valley of Ohio, southern Ohio points and Wheeling, W. Va.

Complaint having been made by the affected steel interests against the new regulations and increased rates, the commission will enter upon a hearing. It is expected to set the date in the near future. The latest complaint was made by the National Tube Co., McKeesport, Pa., its legal representative having telephoned the protest from Pittsburgh to the commission at Washington.

The Federal Trade Commission

Washington, Sept. 15.—Contrary to the usual order of things in Congress these days, the House last Thursday adopted the conference report on the Federal Trade Commission bill without a roll call. Votes against the report were so few and faint as to have been practically negligible. Republicans, along with Democrats, eagerly claimed credit for the legislation. Minority Leader Mann took occasion to congratulate members of the committee on interstate and foreign commerce "upon the successful outcome of this legislation."

"I would like to say," he added, "to our Democratic friends that here is a bill which from the start was made devoid of partisan politics."

The conference report having been previously adopted by the senate, the bill went to the President.

At some length, Representative J. Harry Covington, of Maryland, who was chairman of the sub-committee of the interstate and foreign commerce committee that had the bill in charge, explained the changes made in the measure since it left the House. Mr. Covington is soon to leave the House, having been appointed by the President chief justice of the supreme court of the District of Columbia.

Among the changes referred to by Representative Covington was the one by which the number of commissioners has been increased from three to five. President Wilson has announced that he will name the commissioners at the December session. It was pointed out by Mr. Covington that at the time the House bill was passed the commission did not have conferred upon it the power to deal with unfair methods of competition. This, he said, will make the work of the commission sufficiently heavy to require five commissioners. In practically all of the other features of the House bill, it was stated, the conference report shows there has been substantial and, in many instances, precise adherence to it. The Bureau of Corporation is abolished, as in the House bill, and its powers conferred upon the Federal Trade Commission.

Froth in the Senate

Washington, Sept 15.—Senator Gallinger of New Hampshire, is bitterly opposed to the proposal to tax freight, to increase revenue and thinks one way in which the situation could be met is by making the full assessment fall upon beer, wines and whiskey. In the midst of an attack on the river and harbor bill in the Senate last Saturday, he diverted his attention to the revenue bill and aimed some sharp thrusts at it. Upholding his plan to tax exclusively beer, etc., he ventured the opinion it might also have the effect of promoting temperance.

"However," interrupted Senator Norris of Nebraska, "it would mean more foam and less beer."

"May I suggest," said Senator James Hamilton Lewis of Illinois, "that it would also put more froth in politics."

New Chicago Sales Company

A new sales corporation has been formed in Chicago named the Clawson-Fisher Steel & Tin Plate Co. This concern will represent the Massillon Rolling Mill Co., Massillon, O., the McKeesport Tin Plate Co., McKeesport, Pa., and the N. & G. Taylor Co., Philadelphia. Its business will be strictly in tonnages among the large manufacturing and jobbing trade in the state of Illinois, Indiana, parts of Wisconsin, Michigan, Ohio, etc.

Both active members of this corporation, Austin Clawson and Edwin G. Fisher, have been in the employ of Follansbee Brothers Co. for many years. Mr. Fisher is still with the Follansbee company, but will take up his new work Oct. 1.

Clawson-Fisher Steel & Tin Plate Co. is located at suite 925, Continental & Commercial Nat'l Bank building, Chicago.

In New Plant.—The United States Motor Truck Co., Cincinnati, recently has been reorganized under the laws of Kentucky with a paid-up capital of $300,000 and is now installed in its new factory at Seventeenth and Madison avenue, Covington, Ky. It will continue to make its 2½, 3 and 4-ton trucks and on Jan. 1 will add two more models to the present line. The company also has a special department devoted to the manufacture of tractors for commercial and fire department use. The directors of the company are: R. C. Stewart, president; R. S. Stewart, vice president; Ben Bramlage, secretary; and E. S. Lee, treasurer. W. A. Stone is general sales manager.

Redfield Will Name a Committee

To Make Definite Recommendations to Promote Trade With South America—Numerous Vessels to be Transferred to American Registry

Washington, Sept. 12.—Following the conference in this city between diplomatic and consular representatives and United States banking and commercial representatives, Secretary of Commerce Redfield, acting upon the action of the conference, will name a committee of seven to make concrete recommendations to relieve industrial and financial problems in Latin-America. The conference did not advocate another general meeting.

The committee to be named by Secretary Redfield will consist of representatives of the National Foreign Trade Council, already at work on the problem with a consular delegation in New York, and agents of the American commercial organizations and the Pan-American Union. The trade council's board consists of its chairman, President James A. Farrell of the United States Steel Corporation; President E. P. Thomas of the United States Steel Products Co.; Willard Straight of the American Asiatic Association; President William Bayne of the New York Coffee Exchange, and other representatives of exporting and commercial firms.

It was pointed out at the conference that new markets must be found for the products of the South American countries, and a system of exchange established that will produce revenues for crop-moving and development purposes. The situation in Latin-America, due to the European war, was declared to be distressing. The tremendous opportunity for the growth of American trade on the southern continent was urged as an incentive for immediate action.

It was urged by several South Americans that American money be employed for the development of huge industrial enterprises, but representatives of the banking interests agreed that the problem at home would not permit of that at the present time.

Assurance was given the diplomats by Secretary Redfield that American manufacturers and bankers would extend every possible feature of co-operation. It was his belief that the main needs for developing commerce between the two countries consisted of a system of direct exchange, ready means of transportation, and a thorough understanding. It was suggested by the Secretary that the governments of South America might co-operate in the stablishment of a direct exchange system.

Minister Calderon of Bolivia said better shipping facilities, lower freight rates, credit extension and mutual confidence and good will between the merchants of North and South America were outstanding needs for trade development. Francisco Escobar, consul general of Colombia at New York, said the main revenue of South American nations, derived from taxing foreign trade, principally imports, had broken so suddenly that the custom houses are hardly taking in enough to pay the running expenses of the government. He said those countries need an immediate market for their exports and some one to sell them the things which can no longer be obtained from Europe, which at the time the war broke out, was doing more than 80 per cent of the South American trade, with the single exception of Colombia.

Mr. Escobar gave this outline of Colombia's needs: "A strong American bank in Bogota with branches in the principal cities, American missionaries of commerce to "make friends with our people and overcome the existing antipathy and distrust," and suitable goods.

"We must have the goods we need," said Mr. Escobar, "and not the goods the American manufacturer thinks we ought to have."

Coming Under the Flag

New York, Sept. 14.—Progress is being made in the transfer to American registry under the new shipping laws and regulations, of a large number of vessels formerly flying foreign flags. At the present time, from 35 to 40 ships, with a tonnage of about 200,000 gross, already have made the formal transfer, or are taking the final steps for such action. The United Fruit Co. has taken definite action to place 20 passenger-carrying and five freight vessels under the American flag. This company has taken out charters under New York state laws, for 25 corporations with a nominal capital of $1,000 each, which bear the title of the single boat which they will cover. The company now is having built at Belfast, seven other passenger vessels which also will be transferred as soon as completed. The United Fruit Co. fleet has been carrying on business between Atlantic seaboard ports and the West Indies, Central and South America. These vessels previously have been under the British flag.

The United States Steel Corporation has applied for the registration of ten of its vessels now operated by two British companies, the Isthmian Steamship Line and the New York and South American Steamship Co. The Steel Corporation boats being transferred are Bantu, Santa Rosalia, San Francisco, Kentra, Buena Ventura, Craster Hall, Charlton Hall, Howick Hall, Crofton Hall and Foxton Hall. The Corporation has under permanent charter a number of its deep-sea vessels, which ultimately, it is believed, will come under the American flag. The title of the vessels to be transferred by the Steel Corporation will be vested either in the United States Steel Products Co. or in a new subsidiary to be formed.

Looking for New Fields

Detroit, Sept. 15.—Detroit motor car manufacturers, as well as producers along other lines, are seriously contemplating the sending of expert trade men to South America for the purpose of interesting buyers in the Latin countries of America in the products of Detroit.

The local capitalists realize that it is in South America that the export trade of the United States must be developed while the European nations are at war and locally it is also understood that it is absolutely necessary that men be secured who understand the situation in the continent south of us.

The Ford Motor Co., The Packard, the Studebaker, the Hupmobile and other large automobile manufacturing concerns have done a big business in Europe in past years and they must find an outlet for their production. South America offers this. Detroit manufacturers realize that the European trade will be an impossibility for several years after the war because the various countries will be so near to ruin, in a financial sense, that they will have no money for motor cars.

Permanent Exhibitions Proposed

New York, Sept. 14.—Permanent exhibitions of American manufactured articles to be maintained at important South American centers, are suggested by the National Bank of New York City, in a statement issued to manufacturers and merchants in New York City and New England. The National City Bank states that for the last three years, the Commercial Association of the City of Chicago has maintained such an ex-

hibit at Buenos Ayres. The individual cost to the companies participating in this exhibit has been $100 a year for approximately 30 square feet of space. It is stated that there should be at least 500 firms in New York and in the New England states, which would be willing to maintain such an exhibit. The exhibit would be designed to serve as a center for American activities where purchasers would be invited to inspect the goods which would be displayed by representatives of the various firms. In the case of machinery, skilled mechanics and demonstrators would be employed to point out and make clear the advantages of the American designs. "An exhibit of this kind would be one of the most practical means of directing the attention of South America to the American products," says the National City Bank.

Money Shortage

Cincinnati, Sept. 14.—The Blymyer Iron Works, Cincinnati, on Sept. 11, shipped a car load of sugar machinery to Venezuela into a territory that has heretofore been supplied almost wholly by German manufacturers. Prospects for additional orders in South America are good, especially in Venezuela and Colombia, but users in these countries appear to be short of ready money, and are finding it a difficult matter to induce manufacturers in the United States to sell them on long time payments. Cincinnati manufacturers of special machinery expect to secure a fair number of orders from South American fields during the next three months, but these would be greatly increased if more ready money was available.

Benefits from the War

Trenton, N. J., Sept. 15.—The John A. Roebling's Sons Co. is beginning to feel the effects of the European war in a prosperous way. Both the plants here and at Roebling, N. J., were almost entirely closed for two weeks. Two large orders have placed the big plant in running order again. One comes from Japan and calls for telegraph wire, while the other is for a large order of wire cloth from a Brooklyn concern. The latter concern formerly had its orders for wire cloth filled in Germany. All of the Roebling mills are now running full handed again.

Plans Proposed in Canada

Toronto, Sept. 15.—The movement on the part of Canadian manufacturers to capture German trade is assuming larger proportions. The bulletin issued by Sir George E. Foster, minister of Trade and Commerce, to the manufacturers calling attention to the opportunity presented and giving elaborate details of the foreign trade of Germany and Austria has resulted in enquiries from practically every manufacturing center in Canada. The department has been kept very busy furnishing trade statistics and tariff information covering all branches of the German export trade, and suggestions as to lines of manufacture to which Canadians might profitably turn their attention.

The latest report issued by the department points out that of the total Canadian imports from Germany for the fiscal year ending Mar. 31, the value of iron and steel goods amounted to $2,824,900, or nearly one-fifth of the total. This includes among a great variety of items tubing to the value of $539,130, steel tires for locomotives, etc., $348,059; cutlery, $379,890; machinery, $252,689; wire, $140,523; angles, beams, etc., $185,138; billets, $68,728; tools and implements, $66,724, and iron and steel ware proper, $93,037. In addition, a great variety of small hardware, other than iron and steel has been imported from Germany, the values of which are given under the heading of metals and manufactures thereof as follows: Brass, $130,389; zinc, $108,736; copper, $52,206; and tin, $29,763. The imports of electrical apparatus were valued at $204,388.

The question of how to aid Canadian manufacturers in supplying this demand of the home market and entering the field open in Britain by the shutting off of the supply of German goods will certainly engage the attention of the Canadian Parliament which will probably be called together in the course of a few weeks. The complete change in the situation since the outbreak of the war will probably lead to a renewal of the agitation for an increase in the tariff or some other form of protection. P. G. Donald, the representative of extensive British importing interests who is negotiating with the large steel companies for supplies of their products, had a conference with the government a few days since and suggested that Canada should adopt the same methods by which Germany built up an export and steel trade by establishing a system of export bounties gradually diminishing as the increasing output reduced the cost of manufacturing. The proposition is receiving the close attention of the government.

In Full Operation.—The Petroleum Iron Works Co., Sharon, Pa., is operating at full capacity. The company recently has taken several attractive orders for oil tanks for shipment to points in Oklahoma, Mexico and California.

Many Topics

To be Discussed at Birmingham Meeting of Institute

New York, Sept. 15.—A tentative list of the subjects and the authors of the papers and discussions to be presented at the fall meeting of the American Iron and Steel Institute at the Tutweiler Hotel, Birmingham, Ala., Oct. 28, has been announced. The list is as follows:

Address by the president, Elbert H. Gary.

"The Modern Development of the Iron and Steel Industry in the South," Thomas K. Glenn, president, Atlanta Steel Co., Atlanta, Ga.

Discussion, George W. Conners, president, Conners-Weyman Steel Co., Birmingham.

Discussion, Gentry Hillman.

"Southern Foundry Pig Iron," J. W. McQueen, vice president, Sloss-Sheffield Steel & Iron Co., Birmingham.

Discussion, J. R. Lemoine, president, United States Cast Iron Pipe & Foundry Co., Burlington, N. J.

Discussion, Paschal Shook, president, Birmingham Chamber of Commerce, Birmingham.

"The History of the Iron and Steel Industry in the South," James Bowron, president, Gulf States Steel Co., Birmingham.

Discussion, Capt. H. S. Chamberlain, president, Roane Iron Co., Chattanooga, Tenn.

Discussion, W. H. Hassenger.

"The Use of Steam Turbines for Various Purposes," F. C. Cutler, chief, Bureau of Steam Engineering, Tennessee Coal, Iron and Railway Co., Birmingham.

Discussion, Mr. Lee, Youngstown Sheet & Tube Co.

Discussion, Alexander Hoerr, of National Tube Co.

"The Repair Department of a Modern Steel Plant," John Hulst, chief mechanical engineer, Carnegie Steel Co., Pittsburgh.

Discussion, Bertram D. Quarrie, general superintendent, Newburgh Works of American Steel & Wire Co., Cleveland.

Discussion, H. L. Bodwell, assistant district manager, American Sheet & Tin Plate Co., Vandergrift, Pa.

"The Use of Titaniferous Ores in the Blast Furnace," F. E. Bachman, blast furnace manager, MacIntyre Iron Co., Port Henry, N. Y.

Discussion, Arthur H. Lee, superintendent blast furnaces, Lackawanna Steel Co., Buffalo.

Working Overtime.—The New Process Gear Corporation, Syracuse, N. Y., reports that it is working overtime to keep up with a volume of business larger than any heretofore handled. Although the plant was doubled in capacity less than two years ago and was at that time claimed to be the largest in the world devoted exclusively to gear making, an additional building is now being erected, and the capacity of the case-hardening and heat-treating departments is again being doubled.

The Berger Mfg. Co., Canton, O., recently issued a new catalog describing the line of steel ceilings made by this concern. The book contains 148 pages and includes many interior views of buildings finished with Berger metal ceilings.

Problems of Capital and Labor

Comprehensive Review of Legislation Affecting Labor, Which Has Been Considered by Present Congress

Washington, Sept. 15.—A review of bills affecting labor which have passed the House in the sixty-second and sixty-third Congresses—some of which have also passed the Senate and been enacted into law—was made recently in the House by Representative David J. Lewis, chairman of the committee on labor. Mr. Lewis took occasion to commend the majority party on the legislation, although some of it was strictly non-partisan and received strong support from the Republican side.

Omitting the partisan aspect given to the review, it is presented herewith as a matter of news interest:

Bills Now Laws

First. The eight-hour bill, extending the operations of the eight-hour law to work done for the government as well as work done by the government.

Second. The bill providing an eight-hour day for all female employes in the District of Columbia.

Third. The dredge workers' eight-hour bill, held to remedy a decision of the Supreme Court that men engaged in dredging work in rivers and harbors are not laborers and mechanics, but seamen, and therefore did not come within the provisions of the general eight-hour law.

An eight-hour provision included in the fortification bill to apply to civilians engaged in the manufacture of ordnance and powder for the government.

An eight-hour provision in the postoffice appropriation bill for postoffice clerks and letter carriers.

An eight-hour provision in the naval appropriation bill making the eight-hour workday apply to workmen employed under the current appropriations.

A provision in the naval appropriation bill requiring all coal purchased for the use of the navy to be mined on an eight-hour workday.

The children's bureau bill "to promote the welfare of children and to devise means whereby the necessities of the parents cannot be used to retard the development of the children."

The industrial commission bill to investigate the entire subject of industrial relations, with a view to ascertaining the best methods of dealing industrial disputes so as to protect the rights of all persons directly or indirectly interested.

The phosphorus match bill to protect the health of workers in the match industry.

The trades dispute act embracing the relation of labor organizations to the anti-trust laws of the country; the regulation of the issuance of injunctions and the guaranty of the right of trial by jury for alleged contempts committed out of the presence of the court.

The Department of Labor bill, creating a department with a secretary who shall be a member of the President's cabinet and who shall have the power of mediation in trade disputes and the right to appoint conciliators in such cases when, in his judgment, it is wise to do so, and while his good offices may be used for the purpose of bringing the contending parties together he shall have no power to enforce his own views upon either of them.

Mr. Lewis spoke of the trades dispute act as being "the greatest single piece of legislation ever passed at the instance of laboring people on the American continent". It was said that "at a single stroke it adjusts all the perversions of exparte court procedure that have arisen by the confessed misuse of the injunction so frequently occurring, grants the constitutional right of trial before an open-minded jury, and corrects the judicial mistakes as to the intent of Congress in passing the Sherman law."

It was declared that everybody understands that section 7 of the Clayton bill would have been written into the Sherman act in 1890 had there been any thought of the application since made of that act. Some honest people, he said, are inclined to think that this section of the Clayton bill may mean a species of class legislation. They were declared to commit the error of considering labor as a commodity. The rules that are rationally applicable to the commodity, it was asserted, can seldom be justly applied to the man.

Bills Passed by House

Bureau of Safety devices bill, now reported favorably to the Senate, which would create in the Department of Labor a clearing house for devices preventive of industrial accidents.

The Hensley and Booher convict-labor bills. One is designed to prevent importation of convict-made goods from foreign countries and the other of convict-made goods from one state to another in competition with the products of free and self-supporting labor.

Seaman's bill. Contrary to Mr. Lewis' opinion, it is not believed this measure, now pigeon-holed in the Senate committee on commerce, will pass at this session.

A provision in the judicial revision bill allowing appeals to the Supreme Court from decisions of the state courts, nullifying state statutes on the ground of conflict with federal law. Mr. Lewis explained that a great many state labor laws have been invalidated by the state courts, but that this provision allows an appeal to the Supreme Court in such cases.

Bills Reported From Committee

The Deitrick bill regulating the use of the so-called Taylor system in government shops.

The Maher bill amending the law under which wages of employes in government navy yards and arsenals are to be determined and giving the Secretary of Labor a voice in such adjustments.

Palmer child-labor bill, regulating ages, hours and conditions under which children may work.

Miners' Charges

Washington, Sept. 15.—In a brief they have filed with the House committee on mines, dealing with the controversy in the Michigan copper mines, the miners charge that the attitude of the copper companies has been at all times "one of defiant arrogance and insulting to the great cause of labor, while the attitude of the miners has been pacificatory and dignified, carefully regardful of the rights of their employers and their duty toward them as employes."

The brief states that the miners have made every honorable concession with a view to ending the "unhappy conflict", and that "the operators' cry of 'alien agitators preventing a settlement' is hypocritical and untrue". The operators' reference to "red socialism" is characterized as "a cowardly subterfuge to becloud the real issue and to create sympathy for their cause in refusing just demands".

The wage system is declared in various instances to compel men to

Problems of Capital and Labor

What Closing of Saloons Has Done in Colorado—Developments in Illinois—An "Open Shop" Special

work for less than a living wage and charges of assaults and outrages by the deputies, gunmen and soldiers on the strikers are made; the deportation of Charles H. Moyer is bitterly attacked and the claim is made that there was interference with free access to postal facilities and other invasions of constitutional rights.

The committee has not stated when action will be taken on the investigation it conducted.

Effect of Closing Saloons

President Wilborn, of the Colorado Fuel & Iron Co., says in regard to the closing of saloons in the Colorado mining districts:

"With the advent of the federal troops all saloons in the coal mining districts were closed, and as a result the efficiency of the workmen has greatly improved, the average production of coal per man increasing about 10 per cent.

"The production at this company's mines in the southern district of Colorado for the first 18 days of April averaged 5.85 tons per day for each miner at work. That was before the federal troops closed the saloons. For the first 18 days of June (with all saloons closed) each man produced 6.52 tons, which meant an average increase in wages of over 11 per cent per man.

"This has confirmed the view long held by us, that if saloons and drinking could be eliminated from the coal districts, not only the miners but the companies would be greatly benefited.

"What I have said applies specifically to the Colorado Fuel & Iron Co., but I think, in a general way, is true of the coal mining industry in the state."

Charges of Extortion

The prosecuting authorities of Granite City, Ill., and the state labor commissioner of Illinois are investigating complaints that certain foremen of the American Steel Foundries have extorted sums of money from laborers and mill workers for giving them or permitting them to hold jobs in the plant.

City Attorney Steel, of Granite City, says that his investigation showed that during the last five weeks several thousand dollars had been paid to the foremen by the laborers. Steel laid the results of his investigations before the attorney general of Illinois and was advised by him to take up the matter with the state labor commissioner, which he has done.

An Illinois statute makes it unlawful for the foreman or superintendent of any factory to exact money from employes for giving them positions or permitting them to hold them.

Chicago Contractors Enjoined

Chicago, Sept 15.—An injunction has been granted in the Superior court forbidding the Sheet Metal Contractors' Association from locking out members of local No. 73 of the Amalgamated Sheet Metal Workers. This organization has been excluded from the Building Trades Council following the calling of various strikes based largely on jurisdictional disputes. The policy of the Building Trades Council is to continue work and arbitrate such difficulties. The contractors' association is expected to abrogate the contract it has with the union and employ non-union men. Assurance has been given by the Building Trades Council that such a move would be sanctioned.

Open Shop Special

A novel edition of a newspaper is is the "open shop" special of *The Bulletin*, San Francisco, of August 29. This number of *The Bulletin* was published under the editorial control of Seneca C. Beach, secretary-manager of the Merchants' and Manufacturers' Association, and was published in accordance with the program of *The Bulletin* to turn over its columns on 13 consecutive Saturdays to representatives of various lines of political and social thought. Five pages are devoted to material relating to capital and labor, and the argument for the open shop is ably presented. Starting on the first page of *The Bulletin* is an article by Mr. Beach, expressing appreciation of *The Bulletin's* courtesy in extending the opportunity to the merchants and manufacturers and other employers of California to present some of their hopes and plans for the upbuilding of the great state. He says that the underlying principle of the open shop, or industrial freedom, is one of simple justice. "We hope," he says, "to educate. We hope to show by the pages of history and the laws of economics, by the laws of supply and demand, and cause and effect, that the open shop is far more advantageous and just to both employer and employe, and also to the community at large, than the closed shop."

In a very significant little article on "Auto Factories", it is pointed out that every big automobile factory in this country is conducted on the open shop principle, but San Francisco has no such factories.

J. W. Mason, president of the Merchants' and Manufacturers' Association, occupies the entire editorial page in presenting the purposes of the association and in quoting from prominent writers in advocacy of the open shop. An article on the "Freedom of Men" is contributed by W. C. Francis, secretary and manager of the Manufacturers' Association of Oregon, and manager of the Pacific Coast Federation and Employers' Association. Pierre N. Beringer writes on "Unionism in San Francisco Not Unionism, but Oligarchy". Mrs. Clara B. Edington writes a very interesting story of a working women's fight for industrial freedom.

Busy Making Horseshoes

A dispatch from Catasauqua, Pa., states that a part of the Bryden Horseshoe Co.'s works of that city has been put on both day and night operations, beginning Sept. 14. During the Boer War the Bryden company furnished most of the horseshoes required by the English army, and it is presumed that it now has received a large order from England. The company ordinarily is a large exporter of horseshoes.

Will Lay Off Many Men

Notice has been posted by the Singer Mfg. Co., Elizabethport, N. J., that 4,000 men, representing half of the force of its large plant in that city, will be laid off for an indefinite period. The working hours of the employes who remain have been cut from 54 to 40 hours. The reduction of the operating force is attributed to the disturbance of the foreign market by the war, as the company is a large exporter from its Elizabethport plant.

TIPS FOR NEW BUSINESS

Equipment needs of the Iron and Steel works, Machine shops, Foundries and other Metal Working plants

At New York, some improvement, both in inquiries and new business has appeared in the machinery market. The change has not been pronounced since it is made up of miscellaneous orders, usually of small size. It has been sufficient, however, to lead some dealers to express the opinion that August marked the low point in recent trade inactivity and that a further improvement now may be expected. The railroads continue their policies of restricted buying and very little demand is coming from this source. The Seaboard Air Line and the Chesapeake & Ohio machine tool lists, which have been before the trade for some weeks, still remain undistributed and there is further doubt that they will be placed in the near future. War conditions in Europe continue to affect the situation both directly and indirectly. Small extensions of manufacturing plants are being made here and there to meet an increased demand for domestic products, arising from the shutting off of supplies from abroad. This development is giving rise to some of the better buying of machine tools and machinery now apparent. One large New England machinery builder who manufactures equipment for making projectile and ordnance shells, is operating very actively at this time. A considerable portion of the orders now being filled by this plant are for European shipment. Large New York houses report considerable inquiry for machinery from England and France, where normally they have a good trade. Few of these inquiries, however, yet have brought orders. Inquiries have been put out in this market for a large list of machine tools, aggregating about $50,000 for shipment to Spain, which originally had been placed with German shops and now virtually has been cancelled. There is a good chance of this business coming to this country. Some shipments continue to go forward to Italy. An interesting incident, in view of present conditions, was the shipment some time ago by an American builder of a large gun lathe to an Austrian arsenal. Representatives of German machinery companies are in better communication with their principals, but the advices received show a confused condition in that country, which leaves the affairs of these companies and their ability to carry on business very uncertain.

At Pittsburgh, gloom caused by the stupendous war raging in western Europe continues to depress the market for machine tools and mill equipment, which is even quieter than it has been at any time in the last 18 months. Builders have come to a realization that export trade will develop slowly, if at all, and it does not appear at present as if foreign buyers were in a position to finance large purchases. The domestic trade is decidedly unsatisfactory. Some agents report they have not received a definite inquiry since the outbreak of hostilities abroad and others advise that contracts taken a few weeks prior to the declarations of war have been held up for an indefinite period. Builders of road-working machinery and clay-working equipment report a fairly satisfactory demand for their lines.

In Cincinnati, the outlook for machine tool business in September is not very encouraging. Manufacturers here state that orders during August were considerably below those in July, and that they expect September to be far below August. This is not usually the case, as August has generally been the dull month of the year, but in September business has always picked up at the beginning of fall trade. Machine tool makers here also insist that there are no prospects from South American fields worth mentioning, as very few users in that country have available money at the present time and shippers here cannot afford to grant long-time payments. A number of machine shops in this city have closed down completely because of lack of orders, and others are operating on a small scale. One of the largest plants manufacturing lathes in the world, located in Cincinnati, and which sells mostly to foreign countries, has been forced to suspend operations because of the war. The only bright spot in the machinery market is special equipment, such as sugar, laundry and baking machinery, for which good-sized orders have been received recently, those for sugar machinery coming from the south. Foundries are operating at about 35 per cent of capacity, as they depend, to a large extent, upon machine tool makers for business.

EASTERN STATES

LYNDONVILLE, VT.—A. N. Wetherbee has leased the site of the Novelty Works factory and will rebuild the factory at once.

BOSTON.—Pittman & Brown Co. has purchased the base ball property in Salem, Mass., and will erect a wood-working plant to replace the one destroyed by fire last June.

BOSTON.—Colonial Electric & Mfg. Co. has been incorporated; $35,000; by Edward G. Carter, J. Frank Russell, Frank L. Newers.

MIDDLETOWN, CONN.—Oscar Nelson of the Pickering Governor Co., Portland, Conn., has leased land in this city and plans to erect a machine shop.

STAFFORDVILLE, CONN. — Garland Woolen Mill was destroyed by fire; loss about $70,000.

WATERBURY, CONN.—Pilling Bros. Co. has awarded the contract for its 52 x 111-foot brick factory building to be erected on Watertown avenue.

WATERBURY, CONN.—D. E. Cronin has been awarded contract to erect a factory building on Watertown avenue for the Phillips Brass Co.

BROOKLYN. — American Sugar Refining Co. is receiving bids for the construction of a large filter plant.

GENEVA, N. Y.—Geneva Cutlery Co. will begin the erection of a 40 x 70-foot addition to its plant for the manufacture of razors.

NEW YORK.—Pan-American Brake Co., foundries, pattern shops, smelting steel products, has been incorporated; $10,000; by R. W. Marshall, L. G. Nilson, J. A. Noble, 469 Eastern Parkway, Brooklyn.

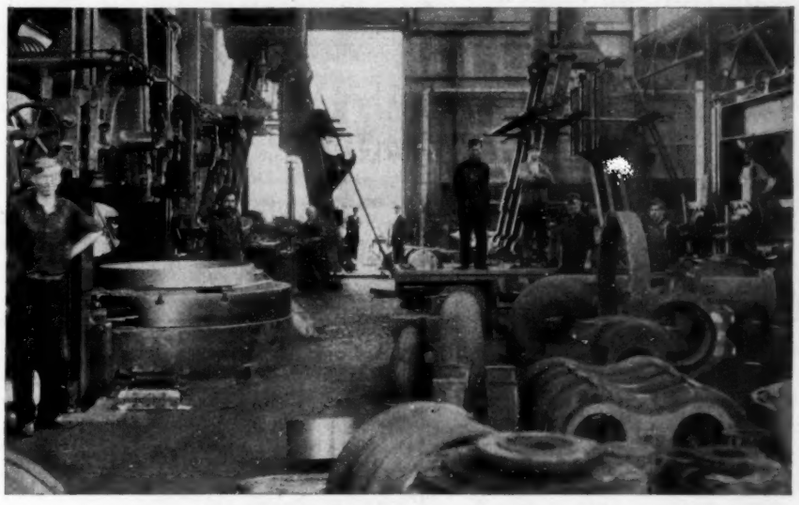
CARLISLE, PA.—S. H. Jackson & Son has started work on their two-story, 35 x 107-foot brick warehouse and machine shop.

Durability!

No Service Too Severe

You would be astonished if you were to enter some of the plants where Ayer & Lord Interior Wood Blocks are installed, and see the amount of "rough stuff" that they are continually withstanding without effect.

Where other floorings would go to pieces, Ayer & Lord Interior Wood Blocks stand intact.



Ayer & Lord Interior Wood Blocks

Durability is but ***one*** of the many desirable features that you get with ***Ayer & Lord Interior Wood Blocks.***

These blocks make the most healthful and sanitary kind of flooring; a flooring that is resilient, restful, silent and dry; a flooring that is dustless, and of the greatest durability and economy.

Write today for our booklet "FLOORS"

Ayer & Lord Tie Company

General Office: Railway Exchange, Chicago

CLEVELAND, O.—801 Swetland Bldg. ST. LOUIS, MO.—554 Pierce Bldg.
KANSAS CITY, MO.—1117 Rialto Bldg. MEMPHIS, TENN.—1402 Exchange Bldg.
PHILADELPHIA, PA.—319 Perry Bldg.

AYER & LORD INTERIOR Always Easy on the Feet WOOD BLOCKS

CHESTER, PA. — Nolan Brothers have started work on the proposed 40 x 100-foot lead tube plant.

EMLENTON, PA.—Additional pumps for water works system will be purchased by city.

LANSFORD, PA.—Panther Valley Light, Heat & Power Co. is receiving bids for a two-story, 40 x 40-foot, hollow tile and concrete power plant to cost about $7,000; address G. M. Davis, president.

MARIETTA, PA. — Marietta Hollow Ware Co., care of A. R. Russell, will erect a $8,000 foundry building to be 1-story, 70 x 70 feet.

PHILADELPHIA.—C. W. Bolton & Son have revised plans for the erection of a one-story, 60 x 80-foot factory in Thompson street.

PHILADELPHIA. — Walters Milling Co. has increased its capital from $50,000 to $200,000.

PHILADELPHIA. — Eastwick Lamp Co. has plans prepared for a 1-story, brick, 40 x 125-foot factory building to be erected at Eighty-fourth and Eastwick avenue.

PITTSBURGH.—The Hockinsmith Wheel & Mine Car Co., with shops at Penn Station, Pa., is in the market for a multiple punch.

PITTSBURGH.—Continental Register Co., signs, has been incorporated; $5,000; by J. M. Glass, Fred Pollack, Wilkinsburg, Pa.

PITTSBURGH.—City asking bids on three elliptical arch bridges over Pine Creek in Shaler township.

PITTSBURGH. — New Rosenbaum building will require two 500-kilowatt generator sets, 50 motors of various powers, pumps, fans, etc. Samuel Gordon is engineer in charge.

PITTSBURGH.—Board of education plans to spend $1,000,000 on new school house, Center avenue and Grant boulevard, of brick and steel construction.

PITTSBURGH.—Allegheny county commissioners asking bids on repairs to bridge at McKeesport. One new steel span, creosoted wood flooring, etc., will be required.

PITTSBURGH.—Diamond Forging Co. is building a 150 x 150-foot addition to its plant on North Side. Some old equipment will be moved to new building and additional equipment will be purchased to double present capacity. D. F. Henry, president; G. B. Wickersham, general manager.

PITTSBURGH.—Plant of Pittsburgh Model Engine Co., East End, is nearing completion; main building, 247 x 235 feet, and power plant, 60 x 65 feet, completed. Machinery and power equipment will be installed this month. Joseph Strassberger, president; E. A. Myers, vice president; J. F. Keenan, treasurer; W. J. Littlejohn, treasurer. Office, Farmers' Bank building.

POINT MARION, PA. — Federated Glass Co. contemplated the erection of a glass plant in South Marion, Pa., and will organize with a capital of $25,000; new name will be the Houze Glass Co., with L. J. Houze the promoter.

BORDENTOWN, N. J.—I. Foreman & Sons have plans prepared for a 1-story, 75 x 257-foot factory building, with sample room, coloring room and engine room wings each 25 x 50 feet.

CAMDEN, N. J.—Victor Talking Machine Co. has awarded the contract to Cramp & Co., Philadelphia, for a $300,000, 6-story, reinforced concrete shipping building, 150 x 300 feet.

NEWARK, N. J.—Public Service Corporation is taking bids for a large power plant to be erected in this city.

CENTRAL STATES

BELLAIRE, O.—American Stamping & Enameling Co. is planning to erect a $200,000 addition to one of its local plants.

CLEVELAND.—Brown Fence & Wire Co. is having plans prepared for a $30,000, 80 x 130-foot warehouse addition to its plant, near Addison road.

CLEVELAND.—Patterson Foundry Specialty Co. has secured a site in Warren, O., and will commence at once the erection of a 50 x 200-foot plant, which will be completed March 1 and which will employ 75 men.

PLAIN CITY, O.—Council is about to authorize a bond issue of $6,500 to repair the light and water plant of this city.

SPRINGFIELD, O.—A. Bentley & Son, Toledo, O., have the general contract for the $198,762 memorial hall to be erected in this city; the present building will be razed at once.

WARREN, O.—Patterson Specialty Foundry Co. has been incorporated; $100,000; by F. J. Patterson, J. F. Williams, Frank Croissant, W. A. Hegg, E. R. Zinger.

COVINGTON, KY.—Cincinnati Locomotive & Car Works Co. will rebuild its plant, which was destroyed by fire a short time ago, mention of which was made in these columns; new equipment will be needed.

GARY, IND.—City voted Aug. 26 for $76,000 for constructing municipal waterworks for Ridge Road district.

SOUTH BEND, IND.—South Bend Lathe Works has been incorporated; $20,000; by M. W. O'Brien, A. L. O'Brien, J. J. O'Brien, to make lathes and machinery.

OTTAWA, ILL.—Albert W. Smith has purchased a site from the Marseilles Wrapping Paper Co., Marseilles, Ill., and will rebuild the Marseilles mill which was destroyed by fire.

QUINCY, ILL.—Modern Iron Works, its plant destroyed by fire, has started to erect a foundry of steel and glass, 179 feet long.

DETROIT.—Maxwell Motor Co. is having plans prepared for buildings to be erected in Oakland avenue, with a view of concentrating the manufacturing of the company in one plant.

SPRINGFIELD, MO.—Opel & Torbitt, architects, 526 Reserve Bank building, are taking bids on a store and office building, 10 stories, 90 x 120 feet, of brick and steel. Probable cost, $300,000.

SOUTHERN STATES

AUSTIN, TEX. — Rio Grande Hardware & Machinery Co. has increased its capital from $20,000 to $50,000.

LITTLE ROCK, ARK.—Arkansas Light & Power Co. has been incorporated; $650,000; by C. H. Counch, John W. Lee, W. R. McCain, J. L. Longino, et al.

MALVERN, ARK.—Arkansas Power Co. is planning improvements in its plant here; cost, about $40,000.

KNOXVILLE, TENN.—Maple Lumber Co. will need power and woodworking machinery for a planing mill which will be built at once; address C. F. Maples.

WESTERN STATES

SALT LAKE CITY.—Newson Safety Elevator Co. will be enlarged; additional machinery will be installed.

COLFAX, WASH.—Bids will be received soon for a steel bridge over the North Palouse river at Elberton and Colfax.

RUSH PRAIRIE, WASH.—Fire badly damaged Graff's sawmill at this place.

SEATTLE, WASH.—Federal Machinery Co. has been incorporated; $10,000; by W. J. Taggard, T. N. Gilmore.

TACOMA, WASH.—Hewitt Steel Corporation has received its charter; $15,000; Henry Hewitt, et al., incorporators.

PORTLAND, ORE.—Proposed formation of a cast iron pipe factory was announced by George M. Harris, who says the total cost of the ground, buildings and equipment will be about $250,000.

SAN FRANCISCO.—Sealed proposals will be received at the office of the Lighthouse inspector, San Francisco, until 2 p. m., Sept. 29 for furnishing duplicate internal combustion engines with direct-connected air compressors of about 30-horsepower each.

Construction News in Brief

BELOW will be found the most important new business items of the week boiled down for the busy reader. They are culled from a great mass of less important information for your benefit. Even if your time is limited, look over this list every week.

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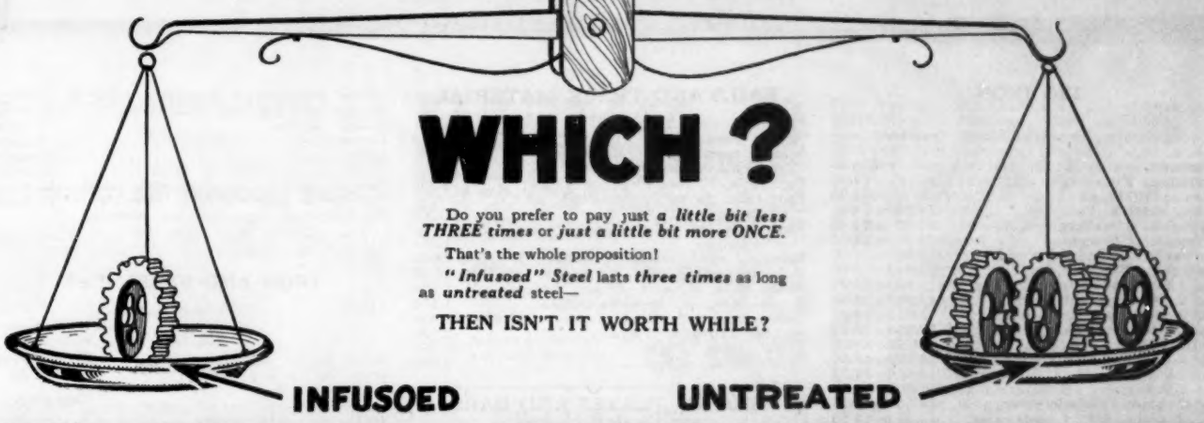
Board of education, Pittsburgh, plans to spend $1,000,000 on a proposed school house to be erected at Center avenue and Grant boulevard, of brick and steel construction.

Don't let First Cost Fool You!


WHICH ?
Do you prefer to pay just a little bit less THREE times or just a little bit more ONCE.
That's the whole proposition!
"Infusoed" Steel lasts three times as long as untreated steel—
THEN ISN'T IT WORTH WHILE?
INFUSOED
UNTREATED

HEAVY SERVICE PARTS

FOR MILL EQUIPMENT

Use Your Good Common Sense!

Be Consistent. You don't hesitate about paying a little more for a pair of shoes if you know that they are going to give you *longer* and *better* service. For exactly the same reason you should not delay about adopting the *"INFUSO" PROCESS!*

Comparison Is Conclusive Proof—

What the *"Infuso" Process* has done for others, it will do for you.

Actual tests have proved that the "Infuso" Process is not a "skin deep" proposition—it is much more effective than *case hardening*—its benefits penetrate through and through, *right to the very core!*

It produces the *STRONGEST, TOUGHEST* and *MOST DURABLE* steel ever manufactured.

ALL WASTE ELIMINATED

The *"Infuso" Process* eliminates all danger of wasted material due to improper treatment.

Don't try to get along without it—it took us eight long years of *continual* and *persistent* experiment and study to perfect this process, but it is yours right now if you will accept it.

Let Us "Infuso" Your Steel—

any parts large or small that will be called upon to undergo severe service. "Infuso" means *115,000 lbs. per square inch more useful strength.*

Yes, *of course* you are interested!

Write Us.

The Steel Improvement Company

CLEVELAND, OHIO

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery Through Third Quarter.)

Bessemer, valley	$14.00
Bessemer, Pittsburgh	14.90
Basic, Pittsburgh	13.90
Basic, eastern Pa.	14.00 to 14.25
Malleable, Pittsburgh	13.90 to 14.40
Malleable, Chicago	13.50 to 14.00
Malleable, Philadelphia	15.50 to 16.00
Malleable, Buffalo	13.00 to 14.00
No. 1X Philadelphia	15.00 to 15.25
No. 2 foundry, Pittsburgh	13.90 to 14.40
No. 2 foundry, Cleveland	13.75 to 14.25
No. 2 foundry, Ironton	13.00 to 13.50
No. 2 foundry, Chicago	13.50 to 14.00
No. 2X foundry, Philadelphia	14.75 to 15.00
No. 2X fdry., (N. J. tidewater)	14.50 to 14.75
No. 2X foundry, Buffalo	13.00 to 13.50
No. 2 plain, Philadelphia	14.50 to 14.75
No. 2 plain, (N. J. tidewater)	14.25 to 14.50
No. 2 plain, Buffalo	12.75 to 13.25
No. 2 southern, Birmingham	10.00 to 10.50
No. 2 southern, Cincinnati	13.25 to 13.75
No. 2 southern, Chicago	14.60 to 14.85
No. 2 southern, Philadelphia	15.00 to 15.25
No. 2 southern, Cleveland	14.35 to 14.85
No. 2 southern, New York	14.75 to 15.00
No. 2 southern, St. Louis	14.00 to 14.25
Virginia 2X, Philadelphia	15.30 to 15.55
Virginia, 2X, Jersey City	15.30 to 15.75
Virginia, 2X, New Eng., all rail	15.75 to 16.25
Gray forge, (eastern Pa.)	13.75 to 14.00
Gray forge, Pittsburgh	13.65
Gray forge, Birmingham	9.00 to 9.50
Silveries, 8 per cent, Cleveland	17.55
Silveries, 5 per cent Birmingham	12.50
Silveries, 5 per cent, Chicago	16.35
Standard low phos., Phil.	21.00 to 21.50
Lebanon low phos., furnace	17.00 to 17.50
Low phos., Pittsburgh	21.15 to 21.40
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.75 to 16.50
Charcoal, Buffalo	15.75 to 16.75
Charcoal, Birmingham	25.00
Middlesbrough, No. 3, Phila., ex-ship	15.00 to 15.25

IRON ORE

(Lower lake ports.)

Old range Bessemer, 55 per cent	$3.75
Mesabi Bessemer, 55 per cent	3.50
Old range, non-Bess., 51½ per cent	3.00
Mesabi, non-Bessemer, 51½ per cent	2.85

(Per unit Philadelphia.)

Foreign Bess., 50 to 65 per cent	7c
Foreign non-Bess., 50 to 65 per cent	7c

COKE

(At the ovens.)

Connellsville furnace	$1.65 to 1.75
Connellsville fur. contr.	1.75 to 1.85
Connellsville foundry	2.25 to 2.50
Connellsville fdy., contr	2.35 to 2.50
Wise county furnace	1.85 to 2.10
Wise county foundry	2.25 to 2.75
Pocahontas furnace	1.80 to 2.05
Pocahontas foundry	2.25 to 2.40
New River, foundry	2.75 to 3.50
New River, furnace	2.20 to 2.35

FERRO-ALLOYS

Ferro-manganese, Baltimore	$80.00 to 85.00
Ferro-silicon, 50 per cent, Pbgh.	71.00 to 73.00
Ferro-silicon, 50 per cent, Phila.	71.00 to 73.00
Ferro-sil., 12 to 13 per cent, Pgh.	22.90
Ferro-sil., 11 to 12 per cent, Pgh.	21.90
Ferro-sil., 10 to 11 per cent, Pgh.	20.90
Ferro-sil., 9 to 10 per cent, Pgh.	19.90
Ferro-carbon titanium, carloads, per lb.	8c to 12½c

SEMI-FINISHED STEEL

Billets, Pbgh. and Yn.	$21.00
Open-hearth bil., Phila.	22.40 to 23.40
Sheet bars, Pittsburgh and Yn.	22.00
Forging billets, Phila.	25.40 to 26.40
Forging billets, Pittsburgh	26.00
Wire rods, Pittsburgh	26.00

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh.	1.25c
Stand. open-hearth rails, Pbgh.	1.34c
Light rails, 8 lbs., Pbgh. or Chi.	1.40c
Lgt. rails, 12 lbs., Pbgh. or Chgo.	1.35c
Lgt. rails, 16 to 20 lb., Pbgh. or Chicago	1.30c
Lgt. rails, 25 to 45 lbs., Pbgh. or Chicago	1.25c
Relaying rails, standard, Chgo.	$23.00 to 24.00
Relaying rails, light, Chicago	21.50 to 22.50
Angle bars, st. sect. Pbgh., base	1.50c
Angle bars, st. sections, Chgo.	1.50c
Spikes, railroad, Pbgh.	1.40c to 1.45c
Spikes, railroad, Chgo.	1.55c
Track bolts, Pbgh.	2.00c
Track bolts, Chgo.	2.00c

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.20c
Structural shapes, Chicago	1.38c
Structural shapes, Philadelphia	1.30c to 1.35c
Structural shapes, New York	1.31c to 1.36c
Structural shapes, San Francisco	2.00c to 2.05c
Tank plates, Chicago	1.38c

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 pounds to:—

New York	16 cents
Philadelphia	15 cents
Boston	18 cents
Buffalo	11 cents
Baltimore	14½ cents
Cleveland	10 cents
Cincinnati	15 cents
Chicago	18 cents
Minneapolis and St. Paul	32 cents
Denver	67½ cents
St. Louis	22½ cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast, (all rail)	80 cents
Pacific coast, via Panama canal	46 cents

Tank plates, Pittsburgh	1.20c
Tank plates, Philadelphia	1.30c to 1.35c
Tank plates, New York	1.31c to 1.36c
Bars, soft steel, Pittsburgh	1.20c
Bars, soft steel, Chicago	1.38c
Bars, soft steel Philadelphia	1.30c to 1.35c
Bars, soft steel, New York	1.36c
Hoops, carloads, Pittsburgh	1.25c to 1.30c
Hoops, less carloads, Pittsburgh	1.30c to 1.35c
Bands, Pittsburgh	1.20c
Shafting, carloads, Pbgh., disc. contract	66 to 67
Shaft'g less carl'ds, Pbgh., disc.	63
Bar iron, Chicago	1.07½c to 1.12½c
Bar iron, Philadelphia	1.15c to 1.20c
Bar iron, New York	1.20c to 1.30c
Bar iron, Cleveland	1.20c
Bar iron, Pittsburgh	1.20c to 1.25c
Hard steel bars, Chicago	1.25c to 1.30c
Smooth finish'g mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	1.95c to 2.00c
No. 28, black, Chicago	2.18c
No. 28, tin mill, black, Pbgh.	1.95c
No. 28, galvanized Pbgh.	2.95c to 3.00c
No. 28, galvanized, Chgo.	3.18c
No. 10, blue, annealed, Pbgh.	1.40c to 1.45c
No. 10, blue, annealed, Phila.	1.50c
Tin plate, 100 lb., coke, base	$3.60 to 3.75

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickled, cold rolled	30 cents
Hot rolled, pickled and annealed	25 cents
Full pickled, cold rolled and re-ann.	50 cents
Blued stove pipe stock	10 cents
Range steel	30 cents
Re-squaring	10 cents
Roller levelling	10 cents
Patent levelling and re-squaring	35 cents
Oiling sheets	10 cents
Deoxidizing	10 cents
Lime finish	10 cents
Open hearth stamping steel	50 cents
Special open hearth deep stpg. steel	65 cents
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents

No reduction for sheets not annealed

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsburgh.)

	Black Butt-weld.	Galv. Butt-weld.
Steel, ⅛ to 3 inches	80	71½
Iron, ⅛ to 2½ inches	70	61
	Lap-weld.	
Steel, 2½ to 6 inches	79	70½

BOILER TUBES

Steel, 3½ to 4½ inches	73
Iron, 3½ to 4½ inches	60

WIRE PRODUCTS

Wire nails, jobbers, Pittsburgh	$1.55 to 1.60
Wire nails, retailers, Pittsburgh	1.60 to 1.65
Plain wire, jobbers, Pittsburgh	1.35 to 1.40
Plain wire, retailers, Pittsburgh	1.40 to 1.45
Galvanized wire, jobbers, Pbgh.	1.75 to 1.80
Galvanized wire, retailers, Pbgh.	1.80 to 1.85
Polished staples, Pbgh.	1.55 to 1.60
Galvanized staples, Pbgh.	1.95 to 2.00
Barb wire, painted, jobbers, Pbgh.	1.55 to 1.60
Barb wire, painted, retail'rs, Pbgh.	1.60 to 1.65
Barb wire, galv., retail's, Pbgh.	2.00 to 2.05
Barb wire, galv., jobbers, Pbgh.	1.95 to 2.00

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled threads, 80 and 20; cut threads, 80 and 15; larger or longer, 75 and 15.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter, rolled, 80 and 25; cut, 80 and 20; larger or longer, 80.

Gimlet and cone point lag or coach screws, 80 and 25.

Hot pressed square, blank or tapped nuts, $6.30 off list; hot pressed hexagon blank or tapped, $7.20 off.

Cold pressed, c. and t. square, blank or tapped, $6 off; hexagon, blank or tapped, ⅜ inch and larger, $7.20; ⅜-inch and smaller, $7.80.

RIVETS

Structural rivets, Pbgh.	1.55c to 1.60c
Structural rivets, Chgo.	1.68c
Boiler rivets, Pbgh.	1.65c to 1.70c
Boiler rivets, Chgo.	1.78c

SCREWS

(New York.)

Lag, gimlet and cone point	80 and 20
Coach, gimlet point	80
Standard Jack	70 and 10
Mch., cut thread, flat head	50 and 10
Mach., cut thread, round head	50 and 10 and 10
Mch., cut thread, fillister hd.	40 and 40 and 10
Mch. rolled thread, flat head or round head	80 and 10
Set screws, iron	75 and 10 and 10
Set screws, steel, per cent advance over iron	25
Square head cap screws	70 and 10 and 10
Hexagon head cap screws	70 and 10 and 10
Fillister head cap screws	60 and 10 and 10
Flat head wood screws	10 and 10 and 5
Round head wood screws	10 and 10 and 5

CAR WHEELS

33-inch engine truck wheels	$22.50
36-inch engine truck wheels	23.50
33-inch tender wheels	18.50
36-inch passenger train car and tender wheels	21.50
33-inch freight car wheels	15.50

All with standard 2½ inch rims and minimum standard hubs, usual extras applying for thicker rims and larger hubs; all f. o. b. cars, Pittsburgh.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	1.55c to 1.60c

TWISTED REINFORCING BARS

(Soft steel, Pittsburgh mill.)

⅜-inch and larger	1.25c
⅝-inch	1.30c
½-inch	1.35c
⅜-inch	1.50c
¼-inch	1.75c

TACKS

(New York.)

	Discount.
American carpet tacks..	90 and 20 and 10 and 10
American cut tacks....	90 and 20 and 10 and 10
Railroad tacks	90 and 50 and 10
Gimp tacks	90 and 20 and 10 and 10
Finishing nails	70

WIRE ROPE

Galvanized, iron and steel	47½ and 2½
Bright, iron and steel	55 and 2½

COLD ROLLED STRIP STEEL

(Subject to regular extras.)

Base price Cut to length		0.10 to 0.19 Carbon
Hard.	Soft.	1½ in. and wider.
2.85	3.10	0.100 and thicker
2.95	3.20	0.050 to 0.099 inc.
3.10	3.35	0.035 to 0.049 inc.
3.35	3.75	0.031 to 0.034 inc.
3.60	4.00	0.025 to 0.030 inc.
3.80	4.20	0.020 to 0.024 inc.
4.70	5.20	0.017 to 0.019 inc.
5.10	5.60	0.015 and 0.016
5.95	6.45	0.013 and 0.014
6.55	7.05	0.012
6.90	7.40	0.011
7.25	7.75	0.010
Coils		
2.75	3.00	0.100 and thicker
2.80	3.05	0.050 to 0.099 inc.
2.95	3.20	0.035 to 0.049 inc.
3.10	3.50	0.031 to 0.034 inc.
3.20	3.60	0.025 to 0.030 inc.
3.30	3.70	0.020 to 0.024 inc.
3.60	4.10	0.017 to 0.019 inc.
4.00	4.50	0.015 and 0.016
4.70	5.20	0.013 and 0.014
5.05	5.55	0.012
5.40	5.90	0.011
5.75	6.25	0.010

CAST IRON PIPE

Three to 24 in., Cleveland	$22.35 to 22.80
Four-inch, water, Chicago	26.50
Six to 12 inches, Chicago	24.50
Larger sizes, Chicago	24.00
Six-inch, water, New York	20.50 to 21.50
Four-inch, water Birmingham	19.50
Six-inch and larger, Birmingham	19.50

Gas pipe, $1 per ton higher than water.

WAREHOUSE PRICES

Steel bars, Chicago	1.65c
Steel bars, Cleveland	1.80c
Steel bars, Cincinnati	1.70c to 1.85c
Steel bars, Philadelphia	1.75c
Steel bars, New York	1.80c
Steel bars, St. Louis	1.70c
Iron bars, Chicago	1.65c
Iron bars, Cleveland	1.75c
Iron bars, St. Louis	1.65c
Iron bars, Cincinnati	1.65c to 1.75c
Iron bars, Philadelphia	1.70c
Iron bars, New York	1.65c to 1.70c
Hoops, Chicago	2.15c
Shapes and plates, Chicago	1.75c
Shapes and plates, Cleveland	1.90c
Shapes and plates, Cincinnati	1.80c to 1.90c
Shapes and plates, St. Louis	1.80c
Shapes and plates, Philadelphia	1.75c
Shapes and plates, New York	1.85c
No. 10 blue ann. sheets, Chgo.	1.95c
No. 10 blue ann. sheets, Cleve.	2.05c
No. 10 blue ann. sh., St. Louis	2.00c
No. 10 blue ann. sheets, Cinci.	1.95c
No. 28 black sheets, Chgo	2.55c
No. 28, black sheets, Cleveland	2.45c
No. 28 black sheets, Cincinnati	2.45c to 2.55c
No. 28 black sh., St. Louis	2.55c
No. 28 galv. sheets, Chgo	3.55c
No. 28 galv. sheets, Cleveland	3.35c
No. 28 galv. sheets, Cincinnati	3.40c to 3.55c
No. 28 galv. sheets, St. Louis	3.55c

IRON AND STEEL SCRAP

(Net Tons.)

No. 1 railroad wrought, Chgo	$ 8.25 to 8.50
No. 1 railroad wrought, Cleve	9.50 to 10.00

Freight Rates, Coke

Connellsville regions, per 2000 lbs., to:—

Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.70
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

No. 1 railroad wrought, St. L	7.75 to 8.00
No. 1 railroad wrought, Cinci	8.00 to 8.50
No. 2 railroad wrought Chgo	8.00 to 8.25
No. 2 railroad wrought, St. L	7.50 to 7.75
Arch bars and transoms, Chgo	11.00 to 11.50
Arch bars and transoms, St. L	11.00 to 11.50
Knuckles, coup. and spr'gs, Chgo.	9.00 to 9.25
Knuckles, coup. and spr'gs, St. L.	9.25 to 9.50
Shafting, Chicago	11.50 to 12.00
Shafting, St. Louis	13.00 to 13.50
Steel car axles, Chgo	11.50 to 12.00
Steel car axles, St. Louis	11.75 to 12.25
Locomotive tires, Chicago	9.00 to 9.50
Locomotive tires, St. Louis	8.75 to 9.25
Cut forge, Chicago	8.00 to 8.25

Freight Rates Via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama Canal, per 100 lbs., in car load lots, exclusive of insurance and dockage.

From New York	$0.30
From Pittsburgh	.46
From Youngstown	.48
From Niles	.48
From Wheeling	.46
From Steubenville	.46
From Johnstown	.44½
From Coatesville	.39
From Steelton	.40
From Bethlehem	.37½
From Cleveland	.49
From Chicago	.60

Pipes and flues, Chicago	5.75 to 6.25
Pipes and flues, Cleveland	7.75 to 8.25
Pipes and flues, St. Louis	5.75 to 6.25
No. 1 cast, Chicago	9.25 to 9.75
No. 1 cast, Cleveland	10.00 to 10.50
No. 1 cast, Cincinnati	8.50 to 9.00
No. 1 cast, St. Louis	9.50 to 10.00
No. 1 busheling, Chicago	6.75 to 7.25
No. 1 busheling, Cleveland	8.25 to 8.50
No. 1 busheling, Cincinnati	5.75 to 6.25
No. 1 busheling, St. Louis	7.25 to 7.50
No. 2 busheling, Chicago	5.75 to 6.00
No. 1 boiler plate, cut, Chgo	6.25 to 6.75
No. 1 boiler plate, cut, Buffalo	9.00 to 9.50
No. 1 boiler plate, cut, St. L	6.00 to 6.50
Boiler punchings, Chicago	8.50 to 9.00
Cast borings, Chicago	4.50 to 5.00
Cast borings, Cleveland	5.75 to 6.00
Cast borings, Cincinnati	4.25 to 4.75
Cast borings, St. Louis	4.00 to 4.50
Machine shop turnings, Chgo	4.50 to 5.00
Machine shop turnings, Cleve	5.25 to 5.75
Machine shop turnings, Cinci	4.25 to 4.75
Machine shop turnings, St. L	4.50 to 5.00
Malleable agl., Chicago	7.75 to 8.25
Malleable agricultural St. Louis	7.50 to 8.00
Malleable, railroad, Chicago	8.25 to 8.50
Malleable, railroad, Cincinnati	6.50 to 7.00
Malleable, railroad, St. Louis	7.50 to 8.00
Angle bars, iron, Chgo	11.50 to 12.00
Angle bars, iron, St. Louis	10.00 to 10.50
Angle bars, steel, Chgo	8.25 to 8.75
Angle bars, steel, St. Louis	9.25 to 9.50
Stove plate, Chicago	8.50 to 8.75
Stove plate, Cleveland	7.75 to 8.00
Stove plate, Buffalo	9.75 to 10.00
Stove plate, Cincinnati	6.50 to 7.00
Stove plate, St. Louis	8.25 to 8.75
Bundled sheet, Cincinnati	4.00 to 4.50
Wrought iron pil'g plates, Clev.	13.00

(Gross Tons.)

Heavy melting steel, Pbgh	$11.50 to 11.75
Heavy melting steel, Buffalo	10.00 to 10.50
Heavy melting steel, Chicago	9.25 to 9.75
Heavy melting steel, Cleveland	10.00 to 10.50
Heavy melting steel, Cincinnati	9.00 to 9.50
H'vy melting steel, eastern Pa	10.50 to 11.00
Heavy melting steel, New York	9.00 to 9.25
Heavy melting steel, St. Louis	11.00 to 11.50
Bundled sheet Buffalo	6.25 to 6.50
Grate bars, Buffalo	9.50 to 10.00
Grate bars, New York	7.00 to 7.50
No. 1 railroad wr'ght, east Pa	12.25 to 12.50
No. 1 railroad wrought, Pbgh	11.50 to 11.75
No. 1 R. R. wght. New York	10.25 to 10.50
No. 1 R. R. wrought, Buffalo	11.00 to 11.50
Shafting, New York	12.00 to 12.50
Pipes and flues, New York	8.50 to 8.75
Pipes and flues, eastern Pa	11.00
Mch. shop turnings, New York	6.25 to 6.50
Machine shop turnings, Buffalo	5.50 to 6.00
Mch. shop turnings, Pbgh	7.75 to 8.00
Mch. shop turnings, eastern Pa	8.50 to 9.00
Cast borings, New York	6.50 to 7.00
Cast borings, eastern Pa	8.50 to 9.00
Cast borings, Buffalo	6.00 to 6.50
Cast borings, Pittsburgh	8.50
Stove plate, (Jersey points)	9.25 to 9.75
Stove plate, Pittsburgh	8.75 to 9.00
Stove plate, eastern Pa	8.50 to 9.00
Shoveling steel, Chicago	8.75 to 9.00
Shoveling steel St. Louis	8.00 to 8.25
Reroll'g rails, 5 ft. & ov., Pbgh	13.00
Reroll. rails, 5 ft. & ov., Chgo	10.50 to 10.75
Reroll. rails, 5 ft. & ov., Cleve	11.00 to 11.50
Reroll. rails, 5 ft. & ov., E. Pa	12.00 to 12.50
Reroll. rails, 5 ft. & ov. St. L	11.25 to 11.50
Steel rails, short, Chicago	10.00 to 10.25
Steel rails, short, Cleveland	12.50 to 13.00
Steel rails, short, St. Louis	10.50 to 10.75
Iron rails, Cleveland nom	13.25 to 13.75
Iron rails, Cincinnati	10.25 to 10.75
Iron rails, eastern Pa	14.00 to 15.00
Iron rails, St. Louis	11.00 to 11.25
Iron rails, Pittsburgh	13.00 to 13.50
Frogs, switches, guards, Chgo	9.50 to 9.75
Frogs, switches & g'rds. St. L	10.50 to 10.75
Car wheels, (iron), Pittsburgh	11.50 to 11.75
Car wheels, (steel), Pittsburgh	12.75 to 13.00
Car wheels, Chicago	10.75 to 11.00
Car wheels, eastern Pa	11.00 to 11.50
Car wheels, Buffalo	12.00 to 12.50
Car wheels (N. J. points)	10.50 to 11.00
Car wheels, St. Louis	11.00 to 11.25
Iron axles, Pittsburgh	20.00 to 21.00
Iron axles, Cincinnati	19.00 to 20.00
Iron axles, eastern Pa	20.00 to 21.00
Iron axles, Buffalo	21.50 to 22.00
Iron axles, Chicago	17.00 to 17.25
Steel car axles, New York	12.50 to 13.00
Steel car axles, Buffalo	15.00 to 15.50
Steel car axles, Cleveland	14.00 to 16.00
Steel car axles, eastern Pa	14.50 to 15.00
No. 1 busheling, Buffalo	8.50 to 9.00
No. 1 busheling, Pittsburgh	9.00 to 9.50
No. 2 busheling, Buffalo	6.00 to 6.50
Low phosphorus steel, Buffalo	15.00 to 15.50
Low phosphorus steel, Pbgh	14.00 to 14.50
Low phos. steel, eastern Pa	14.50 to 15.00
No. 1 forge, eastern Pa	8.50 to 9.00
No. 1 cast, eastern Pa	12.00 to 12.50
No. 1 cast, Pittsburgh	11.50 to 11.75
No. 1 heavy cast (N. J. points)	11.50 to 12.00
Boiler plate, Cleveland	8.50 to 9.00
Mall. iron, agricul., Cleveland	9.00 to 9.50
Mall. iron R. R. Cleveland	10.00 to 10.50
Malleable, railroad, Pittsburgh	9.50 to 10.00
Mall. R. R., Buffalo	10.75 to 11.25
Mall., R. R. east. Pa	9.00 to 9.50
Bundled sheet, Pittsburgh	8.50 to 8.75
Bundled sheet, Cleveland	7.50 to 8.00

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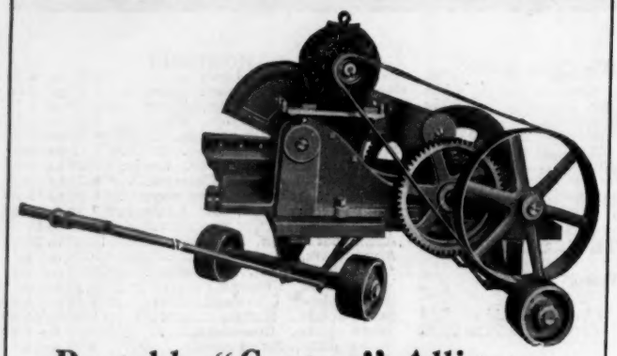

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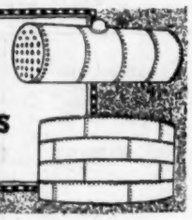

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The Economics of Motor Drive

(*Continued from page* 530)

large motor driving the existing line shafting, the motor being started by a manual device. *Second,* the same motor equipped with push button starting and stopping, eliminating the need of a competent or skilled operator. *Third,* the same installation but in addition equipped with rapid emergency stopping by dynamic braking, operative in case a workman is caught in some machine. *Fourth,* several motors driving groups of machinery with a partial elimination of shafts and belting, a certain measure of flexibility of arrangement, and the ability to run or shut down one group of machines independently of the other groups. In addition, such motors may have the three types of control mentioned above. *Fifth,* a constant speed motor individually driving a machine, eliminating belts and shafting, providing the utmost flexibility in arrangement and location of machinery, giving abundant power and maintained speed at the tool, and permitting running of the machine any time it is desired, regardless of other tools. *Sixth,* the same installation equipped with push button starter, insuring the acceleration of the motor in the shortest safe time and making the operations of starting and stopping so basically simple that any one can accomplish them and that no one can perform them incorrectly. *Seventh,* an adjustable speed motor furnishing precisely the desired speed at the machine and permitting speed changes with the minimum of time and effort. *Eighth,* the same installation but equipped with automatic control, so that the operator, by moving a small lever to different positions, can automatically start, stop, or reverse the motor in the shortest safe time. Such an equipment gives the workman the highest degree of skill and productiveness. *Ninth,* an equipment of motor and automatic control such that after the proper adjustments are made, the machine regularly duplicates a definite cycle of operation until stopped by the operator. In this, the highest development economically, the mechanism not only performs the work, but, to a large extent, does its own thinking.

It is needless to state that any installation must not be considered merely from the standpoint of first cost; all pertinent fiscal factors must be assigned their proper importance. This paper has accordingly been written in the hope that it may afford some slight assistance in recognizing and evaluating the various economic and technical considerations entering into the subject of electric motor drive.

Behavior of Iron in Some Alloys

(*Continued from page* 526)

distinctly higher than that at the top, and the higher the tungsten the more pronounced was the difference between the top and the bottom of the bar.

The micrographic analysis of the tungsten steels had revealed the presence of three new constituents: tungsten-pearlite, tungsten-cementite, and tungsten-hardenite.

Tungsten and Vanadium Compared

It will be evident that in some respects the role of tungsten in steel somewhat resembles that of vanadium, but its action is much less marked. Its points of resemblance are:

(1) It forms no double carbide.

(2) It entirely displaces Fe_3C, but whilst vanadium effects this displacement when only about 5 per cent vanadium is present, it requires about 11 per cent of tungsten to completely expel the carbide of iron.

(3) High tungsten accelerates the segregation of the carbide of tungsten in sorbitic tungsten pearlite into tung-

sten cementite, just as high vanadium hastens the segregation of the V_4C_3 of sorbitic vanadium pearlite into vanadium cementite.

Turning to the question of nickels, the authors explained their efforts to isolate nickel carbide. They decided to cast a series of 1¾-inch-round bars cool as quickly as possible in air and turn the carbide bars from the alloys as cast. This method was to a great extent successful, since in a steel containing about 0.7 per cent carbon and 30 per cent nickel the maximum percentage, namely, 0.13 per cent of graphite, was precipitated.

The obvious conclusion from the results was that in ordinary, somewhat manganiferous, structural steels containing nickel, say, up to 7 per cent, the nickel was not associated with the carbon, but was alloyed with the iron and manganese. This fact seemed to explain the somewhat distinguished position held in steel metallurgy by "nickel-chrome" steels. The chromium was essentially an element exerting its influence as a carbide or hardening constituent, whilst the nickel also present was an element modifying solely the properties of the ferrite by producing in it an augmented elasticity without seriously diminishing its ductility. The question arose in what definite proportions did iron and nickel alloy to produce a specific compound or solid solution?

A Remarkable Alloy

The authors were of opinion that there was a definite alloy of iron and nickel corresponding to the formula Fe_7Ni, and that this substance was perhaps the most remarkable known to ferrous metallurgy. They arrived at this conclusion as the result of some experiments made on the suggestion of Sir Robert Hadfield in 1898.

A table was presented showing the results of chemical and mechanical tests of this alloy. Attention was called to the surprising ductility, namely, 11 per cent elongation, 46 per cent reduction of area and a bending angle of 167 degrees, associated at 13 per cent of nickel with a yield point of 59 tons and a maximum stress of 88 tons per square inch. The stiffness of the alloy when as a ½-inch diameter bar it was bent over by repeated blows from a sledge hammer, was more than remarkable. Nearly pure iron containing 7 per cent of nickel had nearly the same mechanical properties as iron containing about 33.5 per cent of nickel, namely, a yield point of about 30, and a maximum stress of about 38.5 tons per square inch, associated with an elongation on 2 inches of about 30, and a reduction of area of about 57 per cent.

In conclusion, the authors remarked that nickel agreed with all the other elements, the carbides of which they had investigated in being a law unto itself. There was no royal road via pseudo-scientific generalizations to the true scientific metallurgy of steel. Every inch of the ground must be patiently and practically explored. It was true that there was some resemblance between the properties of nickel and manganese, but in their mechanical influences on iron they were often strangely dissimilar. Theoretical metallurgists seemed to lose sight of the fact that the final verdict on their theories must be pronounced by the engineer, who put them to the stern and implacable tests of mechanical practice.

The average value of Pennsylvania bituminous coal at the mines advanced from $1.05 a ton in 1912 to $1.11 in 1913, according to the United States Geological Survey. The average in 1912 was the highest obtained for bituminous coal in Pennsylvania for a period of 30 years, with the exception of the strike years, 1902 and 1903, when, because of a scarcity of all kinds of fuel, prices were abnormally inflated.

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Minimum, 25 words, $1.00. Each additional word, 4c. All capitals, 25 words, $2.00. Each additional word, 8c.

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UNDERSIGNED COUNSEL WILL CONFIDENTIALLY negotiate preliminaries for important executive, technical, administrative and professional positions, insuring strictest privacy. Not an agency, but a highly-endorsed, high grade method of negotiating preliminaries only, for $3,000 to $12,000 men. Send address only for explanation. R. W. Bixby, Lock Box 134-E9, Buffalo, N. Y.

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SALES MANAGER WANTED—A HIGH-grade sales manager who knows the implement game, required to invest some capital; give age, experience, former employer, salary expected; factory located on Missouri river. Address B 12, THE IRON TRADE REVIEW, Cleveland, O.

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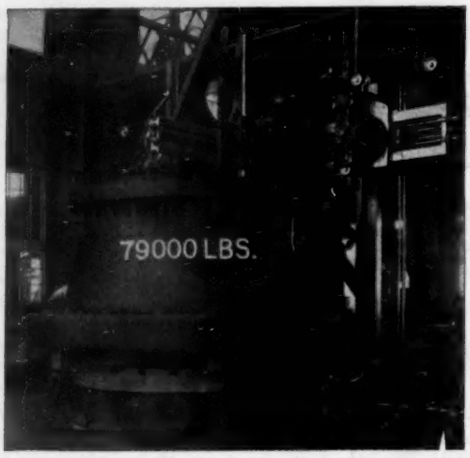

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